



SENGUNTHAR ENGINEERING COLLEGE

(AUTONOMOUS)

NAAC Accredited with 'A' Grade,

(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)
Recognized Under Section 2(f) & 12(B) of the UGC Act, 1956

TIRUCHENGODE- 637 205



CURRICULUM & SYLLABI

B.E. CIVIL ENGINEERING

(CHOICE BASED CREDIT SYSTEM)

REGULATIONS-2023

(REVISION II)

(I - VIII SEMESTER)

(For the students admitted from the Academic year 2025-2026 onwards)

(From (III to VIII Semesters) only applicable for the students admitted the Academic Year during 2023-24 and 2024-25)



Note: The regulations hereunder are subject to amendments as may be decided by the Academic Council of the Sengunthar Engineering College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates including those already undergoing the program under the same Regulation as may be decided by the Academic Council.


Chairman - BoS


DEAN (ACADEMICS)
SENGUNTHAR ENGINEERING COLLEGE
TIRUCHENGODE-637 205


PRINCIPAL
SENGUNTHAR ENGINEERING COLLEGE
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REGULATIONS 2023

CHOICE BASED CREDIT SYSTEM

B. E. CIVIL ENGINEERING

Vision

- To develop highly skilled and socially responsible civil engineers to address the global infrastructure challenges.

Mission

- To equip students with the expertise, ethical and sustainability to lead in emerging technologies.
- To promote research and innovation in construction, exploring smart materials and methods for resilient infrastructure.
- To foster entrepreneurial skills for solving structural engineering problems.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates of B.E. – Civil Engineering program will

- ✓ Exhibit the leadership skills, effectively collaborate in multidisciplinary teams, and uphold ethical practices to achieve project and organizational objectives.
- ✓ Engage in higher studies, applying knowledge in construction field to address infrastructure challenges and drive sustainable development.
- ✓ Develop innovative solutions to complex engineering problems, leveraging entrepreneurial skills and critical thinking to create value in professional practice.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO1	Engineering knowledge	Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4).
PO3	Design / development of solutions	Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet





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		identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO4	Conduct investigations of complex problems	Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO5	Engineering tool usage	Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO6	The engineer and the world	Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7)
PO7	Ethics	Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO8	Individual and collaborative team work	Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO9	Communication	Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.
PO10	Project management and finance	Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	Life-long learning	Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8).

PROGRAM SPECIFIC OUTCOME (PSOs)

PSO1	Develop the professional skills in the area of Structural Engineering, Water Resources Engineering, Transportation Engineering, Geotechnical Engineering and Construction techniques & Management.
PSO2	Plan, analyze, design, prepare cost estimates and execute all kinds of Civil Engineering Projects.





MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME

Year	Sem	Course Name	PO											PSO	
			1	2	3	4	5	6	7	8	9	10	11	1	2
I		23HST101- Professional English	1	1	1.5	2	1	-	-	1.8	3	1.5	2	-	-
		23MAT101 - Matrices and Calculus	3	3	2	-	-	-	-	-	-	-	2	-	-
		23HST102- தமிழர்மரபு/ Heritage of Tamils	-	-	-	-	-	-	2	1	2	-	1	-	-
		23PHT101- Engineering Physics	3	3	1	1	-	-	-	-	-	-	-	-	-
		23CYT102 - Chemistry for Engineers	2.40	2.00	2.80	2.00	2.20	1.60	2.00	1.40	1.20	0.80	1.40	-	-
		23GEE101 - Programming in C	2.83	2.83	2.5	1.8	3.0	-	1.0	1.0	1.33	1.0	2	-	1
		23CEL101- Reverse Engineering Laboratory	3	2	2	2	3	-	-	-	-	-	2	3	2
		23EEC101 – Soft Skills & Life Skills	1.25	1.6	1	1	3	1.4	2	2.6	2.8	2.6	2	-	-
		23MDC101 - Induction Program (2 Weeks)	-	-	-	-	-	-	-	-	-	-	-	-	-
	II	23MAT202 – Differential Equations and Numerical Methods	3	2.4	2	1.4	2	-	-	-	-	-	2	-	-
		23PHT201 – Advanced Physics of Materials	3	2	1	1	-	-	-	-	-	-	-	-	-
		23CYT201 - Environmental Sciences and Sustainability	2	1.4	3	1.6	2.2	3	3	0.8	1.6	2.4	2.2	-	-
		23CET201-Applied Mechanics	3	3	2	2	-	-	-	-	-	-	-	3	3
		23HST202 -தமிழரும் தொழில்நுட்பமும்/ Tamil and Technology	-	-	-	-	-	-	2	1	-	-	1	-	-





MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME

Year	Sem	Course Name	PO											PSO	
			1	2	3	4	5	6	7	8	9	10	11	1	2
I	II	23GET201 - Engineering Graphics	3	2	2	-	3	1	-	-	-	-	2	2	-
		23HSE201 – English for Engineers: Theory and Practice	1	2	-	2	1	2	1.5	2.3	3	2	2	-	-
		23PHL201- Engineering Physics Laboratory	3	3	1	1	-	-	-	-	-	-	-	-	-
		23CYL101- Engineering Chemistry Laboratory	3	3	2	1	1	2	1	1	2	-	-	-	-
		23EEC201 -Indian language (Except Mother Tongue)/ Foreign Language													
		Hindi	-	-	-	-	-	1.0	1.3	1.6	2.8	-	1.6	-	-
		German	-	-	-	-	-	1.0	1.5	1.7	3.0	-	1.6	-	-
		Japanese	-	-	-	-	1.4	1.6	1.0	2.0	2.6	-	1.0	-	-
II	III	23MDC201 – Aptitude Skills	-	-	-	-	-	-	-	-	-	-	-	-	-
		23CET301 - Construction Materials and Practices	3	-	-	-	-	2	-	1	1	1	3	3	-
		23CET302 - Applied Geology	3	-	-	-	-	1	-	-	2	1	2	2	-
		23CET303 - Soil Mechanics	3	2	-	2	-	1	-	-	-	-	3	3	-
		23CEE301- Surveying and Levelling	3	3	3	3	-	1	-	-	1	1	3	3	1
		23CEE302 - Mechanics of Materials	3	3	2	3	-	3	-	-	2	1	2	3	3
		23EEC301 - Professional Development	2.3	1.6	2	2	3	-	-	-	1.5	2.6	1	2	2



MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME

Year	Sem	Course Name	PO											PSO	
			1	2	3	4	5	6	7	8	9	10	11	1	2
II	IV	23CET401 – Reinforced Concrete Design	3	3	3	3	-	2	1	1.6	1.0	1.6	2.4	3	3
		23CET402 – Structural Analysis	3	3	2	3	-	1	-	1	1	1	2.4	3	3
		23CET403 – Highway Engineering	3	1.8	1.6	-	-	2.6	-	2.2	2.2	1	-	2.2	1.7
		23CEE401 - Foundation Engineering	3	3	3	3	-	1.8	1	1	1	1	1.7	2.2	2.8
		23CEE402 – Fluid Mechanics and Machinery	3	3	2	2	-	2	2	-	2	-	-	3	2
		23GEE301 - Problem Solving and Python Programming	2.8	2.7	2.2	1.5	2.8	-	1	1	1.5	1	2	-	1
		23EEEC401 – Online Certification Courses	-	-	-	-	-	-	-	-	-	-	-	-	-
III	V	23CET501- Design of Steel Structures	3	2	3	-	-	-	-	-	-	-	-	2	2
		Professional Elective I													
		23CEP501-Total Station and GPS Surveying	3	2	3	2	3	3	-	-	1	-	-	3	3
		23CEP502-Remote Sensing Concepts	3	3	2	3	3	3	3	3	3	3	1	3	3
		23CEP503-Satellite Image Processing	3	3	3	3	3	3	2	2	2	2	3	3	3
		23CEP504-Cartography and GIS	3	1.4	1.6	1	1.8	1.2	-	-	-	-	-	3	2.2

MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME

Year	Sem	Course Name	PO											PSO	
			1	2	3	4	5	6	7	8	9	10	11	1	2
III	V	23CEP505- Photogrammetry	3	2.4	2.6	2.6	2.4	2.6	2	-	-	-	-	3	2
		23CEP506- Hydrographic Surveying	3	2.3	3	3	3	3	3	3	3	2	2	3	2.8
		Professional Elective II													
		23CEP507- Advanced Structural Analysis	3	2.8	3	2.6	-	2	-	1	2	2	1	3	2
		23CEP508- Dynamics and Earthquake Resistant Structures	3	2.8	2.8	2.4	1.4	2	2	1	1	1	1	3	2.2
		23CEP509- Rehabilitation/ Heritage Restoration	3	2	3	-	-	-	1.2	1.0	1.4	-	-	2	1.6
		23CEP510- Prefabricated Structures	3	2.2	2.6	2.4	1.8	3	1	3	1.6		1	3	2.
		23CEP511- Prestressed Concrete Structures	3	2.2	3	1	-	1	-	1	1	1	1	3	2.4
		23CEP512- Introduction to Finite Element Method	3	2	3	1	1	1	1	2	1	1	1	3	2
		Professional Elective III													
		23CEP513- Formwork Engineering	3	2.5	2.7	2.3	2	2	2	-	2.6	-	2.4	3	2.5
		23CEP514- Construction Equipment and Machinery	3	2.4	2.6	2.2	2.4	2.6	2.4	2.2	2.8	2	2.2	2.4	2.2

MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME

Year	Sem	Course Name	PO											PSO	
			1	2	3	4	5	6	7	8	9	10	11	1	2
III	V	23CEP515-Sustainable Construction and Lean Construction	3	1.3	2.3	2.2	1.5	1.6	2.4	1	1	1	2.4	3	2.6
		23CEP516-Advanced Construction Techniques	3	2.8	2.5	2.6	2.4	2	2	1	1.4	1.4	2.4	2.6	2.8
		23CEP517-Construction Management and Safety	3	3	2.5	2	3	2	1.5	2	2	3	2.8	2.3	2.3
		23CEP518-Energy Efficient Buildings	3	3	2.4	1	2	1	1	3	2	3	-	2.8	2.4
		23CEE501-Concrete Technology	3	2	2	-	-	-	-	-	-	-	2	3	2
		23CEE502-Water Supply and Waste Water Engineering	3	2	2	1	-	2	-	1	1	-	2	2	2
		23EEC503-Industrial Training/Survey Camp	3	2	1	2	2	2	-	2	-	2	2	3	2
		MANDATORY COURSE – I													
		23MDC501-Introduction to Women and Gender Studies													



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Year	Sem	Course Name	PO											PSO	
			1	2	3	4	5	6	7	8	9	10	11	1	2
		23MDC502- Elements of Literature													
		23MDC503- Film Appreciation													
		23MDC504- Disaster Risk Reduction and Management													
		23MDC505- Constitution of India													
III	VI	23CET601-Estimation and Quantitative Surveying	3	2.2	2.8	1	-	-	-	-	1.2	2.4	2.4	2.4	3
		Professional Elective –IV													
		23CEP601-Urban Planning and Development	3	1.2	2.3	2	-	2.8	-	2	2.4	1.6	2.8	2.2	1.8
		23CEP602-Smart Cities	3	1.8	2.6	2	-	2	-	2	2.4	1.8	2.6	2.8	2.6
		23CEP603-Intelligent Transport systems	3	1.6	1.25	2.6	-	2	-	1.2	3	1.6	2.4	2.6	2.2
		23CEP604-Industrial Waste Water Management	3	2.2	2.2	1.8		2		2	2.2	1.6	2	1.8	1.8
		23CEP605-Pavement Engineering	3	2.6	2.2	2	-	1.4	-	1.6	1.6	2.8	1.4	2.8	2.4
		23CEP606-Transportation planning Process	3	2.6	2.6	2.8	-	1.8	-	1.8	1.8	1.6	2.6	2	1.8



MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME

Year	Sem	Course Name	PO											PSO	
			1	2	3	4	5	6	7	8	9	10	11	1	2
		Professional Elective –V													
		23CEP607-Ocean Wave Dynamics	3	2.8	2.7	3	2.7	2.8	2	2.8	2	2	2.5	2.6	3
		23CEP608-Marine Geotechnical Engineering	3	2.4	2	1.4	1.4	1.8	1.4	1.6	1.8	1.2	1.6	2.6	2
		23CEP609-Coastal Engineering	3	3	2.8	3	2.7	2.7	2	2.8	-	2.8	-	2.4	3
		23CEP610-Offshore Structures	3	2.4	2.2	1.8	2.0	2.4	2.0	1.4	2.0	1.4	1.6	3	2.4
		23CEP611-Railway, Airport and Harbour Engineering	3	2.4	2.3	3	-	2	2.5	-	-	2	-	-	2.2
		23CEP612-Coastal Hazards and Mitigation	3	2.7	2.7	2.5	2.5	2	2	2.33	2	3	2	3	2.5
		Professional Elective –VI													
		23CEP613-Geo-Environmental Engineering	3	2.4	2.2	1.8	2.0	2.4	2.0	1.4	2.0	1.4	1.6	3	2.4
		23CEP614-Ground Improvement Techniques	3	2.4	2.2	1.8	2.0	2.4	2.0	1.4	2.0	1.4	1.6	3	2.4
		23CEP615-Pile Foundation	3	3	3	3	-	1.2	2.5	1	1	1	2	2.2	2.8
		23CEP616-Soil Dynamics and Machine Foundations	3	3	3	3	-	1.8	1.2	1	1	1	1.6	2.2	2.8
		23CEP617-Rock Mechanics	3	3	3	3	-	1.8	1.2	1	1	1	2	2.2	2.8
		23CEP618-Earth and Earth Retaining Structures	3	3	3	3	-	1.8	1.2	1	1	1	1.6	2	3

MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME

Year	Sem	Course Name	PO											PSO		
			1	2	3	4	5	6	7	8	9	10	11	1	2	
		Open Elective- I														
		23CEO607 / Environmental and Social Impact Assessment	3.0	3.0	2.4	2.0	2.0	2.2	3.0	-	-	-	2.3	-	-	
		23CSO610 / Introduction to Drone Technologies	2.6	2.8	2.4	1.8	3	-	-	1.5	-	-	2.6	-	-	
		23ECO602 / Fundamentals of Electronic Devices and Circuits	3	3	3	3	2.8	2.4	-	-	-	-	2.4	-	-	
		23EEO603 / Electric Vehicle Technology	3	3	3	3	3	-	-	-	-	-	2	-	-	
		23EEO604 / Renewable Energy Systems	3	3	3	3	3	1	1	-	1	-	2	-	-	
		23MEO601 / Introduction to Industrial Engineering	3	3	2	-	-	-	-	-	-	-	2	-	-	
		23MEO605 / CNC Machining Technology	3	3	2	2	3	-	-	-	-	-	1	-	-	
		23MDO611 / Hospital Management	1	2.4	2	1.5	2	1.6	1.4	1.0	1.0	1.6	1.4	-	-	
		23RAO609 / Fundamentals of Robotics	3.0	2	-	2.8	3.0	2.0	1.0	2.0	2.0	2.3	2.0	-	-	
		23CSO612 / Cyber Forensics and Ethical Hacking	3	2.6	1.75	2.25	2.6	1.6	2.2	0.8	1.2	1	2	-	-	
		23PMO608 / Pharamaceutical Nanotechnology	2.4	2.6	2.4	2.8	2.4	1.8	2	1	-	1	2.2	-	-	
		23MAO606 / Graph Theory	3	2.8	2.3	1	-	-	-	-	-	-	1.4	-	-	



MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME

Year	Sem	Course Name	PO											PSO	
			1	2	3	4	5	6	7	8	9	10	11	1	2
		NCC ARMY/AIRFORCE													
		NCC Airforce Level-1	2.5	2.3	2.2	2.0	2.0	3.0	2.8	2.3	2.6	2.25	2.0	-	-
		NCC Army Level-3	2	2	2.5	-	-	2.5	3	2.5	2.5	2	2	-	-
		23CEE601- Building Planning and Drawing	3	2.7	2.7	1.8	3	2.4	-	1	2.5	2.5	-	3	2.7
		23EEJ601-Project Work-Phase I	3	3	3	3	3	3	3	3	3	3	3	3	3
		MANDATORY COURSE – II													
		23MDC601- Well Being with Traditional Practices- Yoga, Ayurveda and Siddha													
		23MDC602- History of Science and Technology in India													
		23MDC603- Political and Economical Thought for a Human Society													
		23MDC604- State, Nation Building and Politics in India													
		23MDC605- Industrial Safety													
IV	VII	23HST701-Human Values and Ethics	2	2.3	-	3	-	3	3	1	1.5	-	1.6	1	1



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MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME

Year	Sem	Course Name	PO											PSO		
			1	2	3	4	5	6	7	8	9	10	11	1	2	
		Elective Management														
		23MGT701- Principles of Management	1.66	1	1	1.5	1.5	1	1	2	3	1	1	-	-	
		23MGT702- Total Quality Management	3	2	2	-	1	-	-	-	-	-	2	-	-	
		23MGT703- Engineering Economics and Financial Accounting	2.0	2.8	1.7	1.0	2.0	1.4	1.0	1.0	1.2	3.0	1.2	-	-	
		23MGT704- Human Resource Management	1	2	1.5	2	1.5	1.2	1.8	2.2	1.6	1.5	2	-	-	
		23MGT705- Knowledge Management	2.0	2.4	1.7	1.3	1.6	1.3	2.0	1.3	1.5	1.7	2.2	-	-	
		23MGT706- Industrial Management	1.7	3.2	1.0	-	2.0	2.0	2.0	2.4	2.4	3.7	2.0	-	-	
		23MGT707- Supply Chain Management	1.8	2	1.8	1.5	1.5	1.4	1	1	1.5	2	2.2	-	-	
		23MGT708- e-Waste Management	1.8	2.4	2.4	1.8	1.4	2	1.2	1.3	1.8	2	1.8	-	-	
		Open Elective- II														
		23CEO704 - Remote Sensing Concepts	3	-	1	1	2	-	-	-	2	1	1	-	-	
23ECO708-Energy Technology	2.2	2	1.8	3	3	1	1	1	1	1.6	3	-	-			





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MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME

Year	Sem	Course Name	PO											PSO	
			1	2	3	4	5	6	7	8	9	10	11	1	2
		23EE0709 - Sensors, Actuators and its Application	3	3	3	3	3	-	-	-	-	-	2	-	-
		23MEO703 - Fundamentals of Mechatronics	3	2	2	-	-	-	-	-	-	-	1	-	-
		23MEO704- Nano Technology	3	1.8	2.6	2.4	1	2	1.8	1	2.4	1.4	-	-	-
		23MEO712 / Smart Manufacturing	2.0	2.6	2.5	2.0	2.6	-	1.5	-	-	-	1.5	-	-
		23RAO707 / Mobile Robots	3	3	2.8	2.6	2.8	1.2	1	1	1.6	-	1.6	-	-
		23CSO711 - Introduction to Cyber Security	3.0	2.6	2.4	2.3	2.5	2.0	2.0	2.5	1.6	2.0	2.0	-	-
		23PMO706- Intellectual Property Rights for Pharma Industry	2.4	2.2	2.2	1.2	2.2	1.8	1.6	2	1	1	1.75	-	-
		23MAO710 / Operations Research	2.8	3	2.4	1.8	2	1	-	-	-	-	2	-	-
		NCC ARMY/AIRFORCE													
		NCC Airforce Level- 2	2.5	2.5	2.2	2.3	2.5	2.8	2.5	2.3	2.5	2.3	2.0	-	-
		NCC Army Level-4	2	2	2.5	-	2	2.5	2	3	2.5	2	2	-	-





MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME

Year	Sem	Course Name	PO											PSO	
			1	2	3	4	5	6	7	8	9	10	11	1	2
		Open Elective-III													
		23CEO717- Geographical Information System	3	2	2	-	3	2	-	-	2	2	1	-	-
		23CSO715- Fundamentals of Blockchain Technology	2.8	2.4	2.2	2.0	2.8	-	-	-	1.0	-	2.0	-	-
		23ECO718 - VLSI Design	3	3	3	2	2	1.6	1	-	1	1	1	-	-
		23EEO716 - Electrical,Electronic and Magnetic Materials	3	3	3	3	3	-	-	-	-	-	2	-	-
		23MEO720 - Marine Vehicles	3	2	2	2	3	-	-	-	-	-	-	-	-
		23MDO719 - Wearable Technology	2.2	2.4	1.8	1.8	2.3	1.5	1.0	-	-	-	1.4	-	-
		23MDO723 - Medical Waste Management	2	2.4	1.8	1.75	1.8	2.8	2	1	1	1.2	1.2	-	-
		23MDO724 / Lifestyle Diseases	2	2.4	1.8	1.5	2	2.2	1.2	1	1	1.2	1.4	-	-
		23RAO721 / Robotics Process Automation	3	2.8	2.4	2.4	2.8	1.2	-	-	1.2	1.2	1.2	-	-
		23MAO714 / Advanced Numerical Methods	3	3	2.4	1.4	2	-	-	-	-	-	2	-	-
		23MGO722 / Cost management of Engineering Projects	2	2.2	2	1.4	1.4	1	1	1	1	2.8	1.2	-	-





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MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME

Year	Sem	Course Name	PO											PSO	
			1	2	3	4	5	6	7	8	9	10	11	1	2
		23EEJ701- Project Work - Phase II	3	3	3	3	3	3	3	3	3	3	3	3	3
IV	VIII	23EEJ801-Product Development	3	3	3	3	3	3	3	3	3	3	3	3	3
		23EEC801- Internship	3	3	3	3	3	3	3	3	3	3	3	3	3





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CURRICULUM AND SYLLABI

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(For the Students Admitted in the Academic Year 2023-2024 onwards)

B.E - CIVIL ENGINEERING - FIRST SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23HST101	Professional English	HS	3	0	0	3	40	60	100
23MAT101	Matrices and Calculus	BS	3	1	0	4	40	60	100
23PHT101	Engineering Physics	BS	3	0	0	3	40	60	100
23CYT102	Chemistry for Engineers	BS	3	0	0	3	40	60	100
23HST102	தமிழர்மரபு/Heritage of Tamils	HS	1	0	0	1	40	60	100
EMBEDDED COURSE									
23GEE101	Programming in C	ES	3	0	2	4	50	50	100
PRACTICALS									
23CEL101	Reverse Engineering Laboratory	BS	0	0	4	2	60	40	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC101	Soft Skills & Life Skills	EEC	1	0	0	1	100	-	100
MANDATORY COURSE									
23MDC101	Induction Program (2 Weeks)	MC	-	-	-	-	-	-	-
TOTAL CREDITS IN SEMESTER – I					21				

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
GE	:	General Elective
OE	:	Open Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
C	:	Credit Point
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B.E - CIVIL ENGINEERING - SECOND SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23MAT202	Differential Equations and Numerical Methods	BS	3	1	0	4	40	60	100
23PHT201	Advanced Physics of Materials	BS	3	0	0	3	40	60	100
23CYT201	Environmental Science and Sustainability	HS	3	0	0	3	40	60	100
23CET201	Applied Mechanics	PC	3	1	0	4	40	60	100
23GET201	Engineering Graphics	ES	3	1	0	4	40	60	100
23HST202	தமிழரும் தொழில்நுட்பமும் /Tamil and Technology	HS	1	0	0	1	40	60	100
EMBEDDED COURSE									
23HSE201	English for Engineers: Theory and Practice	HS	3	0	2	4	50	50	100
PRACTICALS									
23PHL201	Engineering Physics Laboratory	BS	0	0	2	1	60	40	100
23CYL101	Engineering Chemistry Laboratory	BS	0	0	2	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC201	Indian Language (Except Mother Tongue) / Foreign Language	EEC	0	0	4	2	100	-	100
MANDATORY COURSE									
23MDC201	Aptitude Skills	MC	3	0	0	0	-	-	-
TOTAL CREDITS IN SEMESTER - II					27				

HS	:	Humanities and Social Sciences
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EEC	:	Employability Enhancement Courses
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B.E - CIVIL ENGINEERING - THIRD SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23MAT304	Transforms and Partial Differential Equations	BS	3	1	0	4	40	60	100
23CET301	Construction Materials and Practices	PC	3	0	0	3	40	60	100
23CET302	Applied Geology	PC	3	0	0	3	40	60	100
23CET303	Soil Mechanics	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23CEE301	Surveying and Levelling	PC	3	0	2	4	50	50	100
23CEE302	Mechanics of Materials	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC301	Professional Development	EEC	0	0	2	1	100	-	100
TOTAL CREDITS IN SEMESTER – III			22						

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
OE	:	Open Elective
GE	:	General Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
C	:	Credit Point
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ESE	:	End Semester Examination
TOT	:	Total





B.E - CIVIL ENGINEERING - FOURTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23CET401	Reinforced Concrete Design	PC	3	1	0	4	40	60	100
23CET402	Structural Analysis	PC	3	0	0	3	40	60	100
23CET403	Highway Engineering	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23CEE401	Foundation Engineering	PC	3	0	2	4	50	50	100
23CEE402	Fluid Mechanics and Machinery	PC	3	0	2	4	50	50	100
23GEE301	Problem Solving and Python Programming	ES	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC401	Online Certification Courses	EEC	3	0	0	3	100	-	100
TOTAL CREDITS IN SEMESTER – IV						25			

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
OE	:	Open Elective
GE	:	General Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
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B.E - CIVIL ENGINEERING - FIFTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23CET501	Design of Steel Structures	PC	3	1	0	4	40	60	100
	Professional Elective I	PE	3	0	0	3	40	60	100
	Professional Elective II	PE	3	0	0	3	40	60	100
	Professional Elective III	PE	3	0	0	3	40	60	100
EMBEDDED COURSE									
23CEE501	Concrete Technology	PC	3	0	2	4	50	50	100
23CEE502	Water Supply and Waste Water Engineering	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC503	Industrial Training / Survey Camp	EEC	0	0	4	2	100	-	100
MANDATORY COURSE									
	Mandatory Course-I	MC	3	0	0	0	-	-	-
TOTAL CREDITS IN SEMESTER – V					23				

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
OE	:	Open Elective
GE	:	General Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
C	:	Credit Point
CIA	:	Continuous Internal Assessment
ESE	:	End Semester Examination
TOT	:	Total





B.E - CIVIL ENGINEERING - SIXTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23CET601	Estimation and Quantitative Surveying	PC	3	0	0	3	40	60	100
	Professional Elective IV	PE	3	0	0	3	40	60	100
	Professional Elective V	PE	3	0	0	3	40	60	100
	Professional Elective VI	PE	3	0	0	3	40	60	100
	Open Elective –I/ NCC L1/L3	OE	3	0	0	3	40	60	100
EMBEDDED COURSE									
23CEE601	Building Planning and Drawing	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEJ601	Project Work - Phase I	EEC	0	0	8	4	60	40	100
MANDATORY COURSE									
	Mandatory Course – II	MC	3	0	0	0	-	-	-
TOTAL CREDITS IN SEMESTER – VI					23				

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
OE	:	Open Elective
GE	:	General Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
C	:	Credit Point
CIA	:	Continuous Internal Assessment
ESE	:	End Semester Examination
TOT	:	Total





B.E - CIVIL ENGINEERING - SEVENTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23HST701	Human Values and Ethics	HS	3	0	0	3	40	60	100
	Elective-Management	GE	3	0	0	3	40	60	100
	Open Elective-II/ NCC II L2/L4	OE	3	0	0	3	40	60	100
	Open Elective-III	OE	3	0	0	3	40	60	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEJ701	Project Work - Phase II	EEC	0	0	8	4	60	40	100
TOTAL CREDITS IN SEMESTER – VII					16				

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
OE	:	Open Elective
GE	:	General Elective
EEC	:	Employability Enhancement Courses
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B.E - CIVIL ENGINEERING - EIGHTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
EMPLOYABILITY ENHANCEMENT COURSE									
23EEJ801	Product Development	EEC	0	0	12	6	60	40	100
23EEC801	Internship	EEC	0	0	4	2	100	-	100
TOTAL CREDITS IN SEMESTER – VIII					08				

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
OE	:	Open Elective
GE	:	General Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
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LIST OF HUMANITIES AND SOCIAL SCIENCES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23HST101	Professional English	HS	3	0	0	3	40	60	100
23HST102	தமிழர்மரபு/Heritage of Tamils	HS	1	0	0	1	40	60	100
23HSE201	English for Engineers: Theory and Practice	HS	3	0	2	4	50	50	100
23CYT201	Environmental Science and Sustainability	HS	3	0	0	3	40	60	100
23HST202	தமிழரும் தொழில்நுட்பமும் /Tamil and Technology	HS	1	0	0	1	40	60	100
23HST701	Human Values and Ethics	HS	3	0	0	3	40	60	100

LIST OF BASIC SCIENCES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23MAT101	Matrices and Calculus	BS	3	1	0	4	40	60	100
23PHT101	Engineering Physics	BS	3	0	0	3	40	60	100
23CYT102	Chemistry for Engineers	BS	3	0	0	3	40	60	100
23MAT202	Differential Equations and Numerical Methods	BS	3	1	0	4	40	60	100
23PHT201	Advanced Physics of Materials	BS	3	0	0	3	40	60	100
23MAT301	Transforms and Partial Differential Equations	BS	3	1	0	4	40	60	100

LIST OF ENGINEERING SCIENCES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23GEE101	Programming in C	ES	3	0	2	4	50	50	100
23CEL101	Reverse Engineering Laboratory	ES	0	0	4	2	60	40	100
23GEE201	Engineering Graphics	ES	3	1	0	4	40	60	100
23GEE301	Problem Solving and Python Programming	ES	3	0	2	4	50	50	100



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LIST OF PROFESSIONAL CORE

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23CET201	Applied Mechanics	PC	3	1	0	4	40	60	100
23CET301	Construction Materials and Practices	PC	3	0	0	3	40	60	100
23CET302	Applied Geology	PC	3	0	0	3	40	60	100
23CET303	Soil Mechanics	PC	3	0	0	3	40	60	100
23CEE301	Surveying and Levelling	PC	3	0	2	4	50	50	100
23CEE302	Mechanics of Materials	PC	3	0	2	4	50	50	100
23CET401	Reinforced Concrete Design	PC	3	1	0	4	40	60	100
23CET402	Structural Analysis	PC	3	0	0	3	40	60	100
23CET403	Highway Engineering	PC	3	0	0	3	40	60	100
23CEE401	Foundation Engineering	PC	3	0	2	4	50	50	100
23CEE402	Fluid Mechanics and Machinery	PC	3	0	2	4	50	50	100
23CET501	Design of Steel Structures	PC	3	1	0	4	40	60	100
23CEE501	Concrete Technology	PC	3	0	2	4	50	50	100
23CEE502	Water Supply and WasteWater Engineering	PC	3	0	2	4	50	50	100
23CET601	Estimation and Quantitative Surveying	PC	3	0	0	3	40	60	100
23CEE601	Building Planning and Drawing	PC	3	0	2	4	50	50	100





LIST OF PROFESSIONAL ELECTIVE COURSES

Professional Elective - I

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23CEP501	Total Station and GPS Surveying	PE	3	0	0	3	40	60	100
23CEP502	Remote Sensing Concepts	PE	3	0	0	3	40	60	100
23CEP503	Satellite Image Processing	PE	3	0	0	3	40	60	100
23CEP504	Cartography and GIS	PE	3	0	0	3	40	60	100
23CEP505	Photogrammetry	PE	3	0	0	3	40	60	100
23CEP506	Hydrographic Surveying	PE	3	0	0	3	40	60	100

Professional Elective - II

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23CEP507	Advanced Structural Analysis	PE	3	0	0	3	40	60	100
23CEP508	Dynamics and Earthquake Resistant Structures	PE	3	0	0	3	40	60	100
23CEP509	Rehabilitation/ Heritage Restoration	PE	3	0	0	3	40	60	100
23CEP510	Prefabricated Structures	PE	3	0	0	3	40	60	100
23CEP511	Prestressed Concrete Structures	PE	3	0	0	3	40	60	100
23CEP512	Introduction to Finite Element Method	PE	3	0	0	3	40	60	100





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Professional Elective - III

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23CEP513	Formwork Engineering	PE	3	0	0	3	40	60	100
23CEP514	Construction Equipment and Machinery	PE	3	0	0	3	40	60	100
23CEP515	Sustainable Construction and Lean Construction	PE	3	0	0	3	40	60	100
23CEP516	Advanced Construction Techniques	PE	3	0	0	3	40	60	100
23CEP517	Construction Management and Safety	PE	3	0	0	3	40	60	100
23CEP518	Energy Efficient Buildings	PE	3	0	0	3	40	60	100

Professional Elective - IV

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23CEP601	Urban Planning and Development	PE	3	0	0	3	40	60	100
23CEP602	Smart Cities	PE	3	0	0	3	40	60	100
23CEP603	Intelligent Transport systems	PE	3	0	0	3	40	60	100
23CEP604	Industrial Waste Water Management	PE	3	0	0	3	40	60	100
23CEP605	Pavement Engineering	PE	3	0	0	3	40	60	100
23CEP606	Transportation planning Process	PE	3	0	0	3	40	60	100





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Professional Elective -V

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23CEP607	Ocean Wave Dynamics	PE	3	0	0	3	40	60	100
23CEP608	Marine Geotechnical Engineering	PE	3	0	0	3	40	60	100
23CEP609	Coastal Engineering	PE	3	0	0	3	40	60	100
23CEP610	Offshore Structures	PE	3	0	0	3	40	60	100
23CEP611	Railway, Airport and Harbour Engineering	PE	3	0	0	3	40	60	100
23CEP612	Coastal Hazards and Mitigation	PE	3	0	0	3	40	60	100

Professional Elective - VI

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23CEP613	Geo-Environmental Engineering	PE	3	0	0	3	40	60	100
23CEP614	Ground Improvement Techniques	PE	3	0	0	3	40	60	100
23CEP615	Pile Foundation	PE	3	0	0	3	40	60	100
23CEP616	Soil Dynamics and Machine Foundations	PE	3	0	0	3	40	60	100
23CEP617	Rock Mechanics	PE	3	0	0	3	40	60	100
23CEP618	Earth and Earth Retaining Structures	PE	3	0	0	3	40	60	100





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LIST OF OPEN ELECTIVE COURSES

OPEN ELECTIVES - I

Offered by the Departments	Course Code / Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
CIVIL	23CEO607 / Environmental and Social Impact Assessment	OE	3	0	0	3	40	60	100
CSE	23CSO610 / Introduction to Drone Technologies	OE	3	0	0	3	40	60	100
ECE	23ECO602 / Fundamentals of Electronic Devices and Circuits	OE	3	0	0	3	40	60	100
EEE	23EEO603 / Electric Vehicle Technology	OE	3	0	0	3	40	60	100
	23EEO604 / Renewable Energy Systems	OE	3	0	0	3	40	60	100
MECHANICAL	23MEO601 / Introduction to Industrial Engineering	OE	3	0	0	3	40	60	100
	23MEO605 / CNC Machining Technology	OE	3	0	0	3	40	60	100
MEDICAL ELECTRONICS	23MDO611 / Hospital Management	OE	3	0	0	3	40	60	100
ROBOTICS AND AUTOMATION	23RAO609 / Fundamentals of Robotics	OE	3	0	0	3	40	60	100
CSE(Cyber Security)	23CSO612 / Cyber Forensics and Ethical Hacking	OE	3	0	0	3	40	60	100
PHARMACEUTICAL TECHNOLOGY	23PMO608 / Pharamaceutical Nanotechnology	OE	3	0	0	3	40	60	100
MATHEMATICS	23MAO606 / Graph Theory	OE	3	0	0	3	40	60	100





OPEN ELECTIVES- II

Offered by the Departments	Course Code / Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
CIVIL	23CEO704 / Remote Sensing Concepts	OE	3	0	0	3	40	60	100
ECE	23ECO708 / Energy Technology	OE	3	0	0	3	40	60	100
EEE	23EE0709 / Sensors, Actuators and its Application	OE	3	0	0	3	40	60	100
MECHANICAL	23MEO703 / Fundamentals of Mechatronics	OE	3	0	0	3	40	60	100
	23MEO704 / Nano Technology	OE	3	0	0	3	40	60	100
	23MEO712 / Smart Manufacturing	OE	3	0	0	3	40	60	100
MEDICAL ELECTRONICS	23MDO705 / Ultrasound Principles and its Medical Applications	OE	3	0	0	3	40	60	100
ROBOTICS AND AUTOMATION	23RAO707 / Mobile Robots	OE	3	0	0	3	40	60	100
CSE(Cyber Security)	23CSO711 / Introduction to Cyber Security	OE	3	0	0	3	40	60	100
PHARMACEUTICAL TECHNOLOGY	23PMO706 / Intellectual Property Rights for Pharma Industry	OE	3	0	0	3	40	60	100
MATHEMATICS	23MAO710 / Operations Research	OE	3	0	0	3	40	60	100

OPEN ELECTIVES – III

Offered by the Departments	Course Code / Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
CIVIL	23CEO717 / Geographical Information System	OE	3	0	0	3	40	60	100
CSE	23CSO715 / Fundamentals of Blockchain Technology	OE	3	0	0	3	40	60	100
ECE	23ECO718 / VLSI Design	OE	3	0	0	3	40	60	100
EEE	23EE0716 / Electrical, Electronic and Magnetic Materials	OE	3	0	0	3	40	60	100
MECHANICAL	23MEO720 / Marine Vehicles	OE	3	0	0	3	40	60	100





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MEDICAL ELECTRONICS	23MDO719 / Wearable Technology	OE	3	0	0	3	40	60	100
	23MDO723 / Medical Waste Management								
	23MDO724 / Lifestyle Diseases								
ROBOTICS AND AUTOMATION	23RAO721 / Robotics Process Automation	OE	3	0	0	3	40	60	100
MATHEMATICS	23MAO714 / Advanced Numerical Methods	OE	3	0	0	3	40	60	100
MANAGEMENT	23MGO722 / Cost management of Engineering Projects	OE	3	0	0	3	40	60	100

GENERAL ELECTIVES

Course Code	Name of the Subject	Category	Periods / Week				Credit	Maximum Marks		
			L	T	P	C		CIA	ESE	TOT
23NCCL01	NCC AIRFORCE LEVEL-1	GE	3	0	0	3		40	60	100
23NCCL02	NCC AIRFORCE LEVEL – 2	GE	3	0	0	3		40	60	100
23NCCL03	NCC ARMY LEVEL – 3	GE	3	0	0	3		40	60	100
23NCCL04	NCC ARMY LEVEL – 4	GE	3	0	0	3		40	60	100

ELECTIVE - MANAGEMENT

Course Code	Name of the Subject	Category	Periods / Week				Credit	Maximum Marks		
			L	T	P	C		CIA	ESE	TOT
23MGT701	Principles of Management	GE	3	0	0	3		40	60	100
23MGT702	Total Quality Management	GE	3	0	0	3		40	60	100
23MGT703	Engineering Economics and Financial Accounting	GE	3	0	0	3		40	60	100
23MGT704	Human Resource Management	GE	3	0	0	3		40	60	100
23MGT705	Knowledge Management	GE	3	0	0	3		40	60	100
23MGT706	Industrial Management	GE	3	0	0	3		40	60	100
23MGT707	Supply Chain Management	GE	3	0	0	3		40	60	100
23MGT708	e-Waste Management	GE	3	0	0	3		40	60	100





LIST OF EMPLOYABILITY ENHANCEMENT COURSES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23EEC101	Soft Skills & Life Skills	EEC	1	0	0	1	100	-	100
23EEC201	Indian Language (Except Mother Tongue)/ Foreign Language	EEC	0	0	4	2	100	-	100
23EEC304	Professional Development	EEC	0	0	2	1	100	-	100
23EEC401	Online Certification Courses	EEC	3	0	0	3	100	-	100
23EEC503	Industrial Training/Survey Camp	EEC	0	0	4	2	100	-	100
23EEJ601	Project Work - Phase I	EEC	0	0	8	4	60	40	100
23EEJ701	Project Work - Phase II	EEC	0	0	8	4	60	40	100
23EEJ801	Product Development	EEC	0	0	12	6	60	40	100
23EEC801	Internship	EEC	0	0	4	2	100	-	100

LIST OF MANDATORY COURSES

MANDATORY COURSES - I

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23MDC501	Introduction to Women and Gender Studies	MC	3	0	0	0	-	-	-
23MDC502	Elements of Literature	MC	3	0	0	0	-	-	-
23MDC503	Film Appreciation	MC	3	0	0	0	-	-	-
23MDC504	Disaster Risk Reduction and Management	MC	3	0	0	0	-	-	-
23MDC505	Constitution of India	MC	3	0	0	0	-	-	-





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MANDATORY COURSES - II

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23MDC601	Well Being with Traditional Practices- Yoga, Ayurveda and Siddha	MC	3	0	0	0	-	-	-
23MDC602	History of Science and Technology in India	MC	3	0	0	0	-	-	-
23MDC603	Political and Economical Thought for a Human Society	MC	3	0	0	0	-	-	-
23MDC604	State, Nation Building and Politics in India	MC	3	0	0	0	-	-	-
23MDC605	Industrial Safety	MC	3	0	0	0	-	-	-





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CURRICULUM AND SYLLABI

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(For the Students Admitted in the Academic Year 2023 - 2024 onwards)

CREDIT SUMMARY

B.E. CIVIL ENGINEERING

Category	Credits Per Semester								Credit Total
	I	II	III	IV	V	VI	VII	VIII	
HS	4	8	-	-	-	-	3	-	15
BS	12	9	4	-	-	-	-	-	25
ES	4	4	-	4	-	-	-	-	12
PC	-	4	17	18	12	7	-	-	58
PE	-	-	-	-	9	9	-	-	18
GE	-	-	-	-	-	-	3	-	03
OE	-	-	-	-	-	3	6	-	09
EEC	1	2	1	3	2	4	4	8	25
MC	-	-	-	-	-	-	-	-	00
Total	21	27	22	25	23	23	16	08	165





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SEMESTER I

23HST101

PROFESSIONAL ENGLISH
(Common to all B.E. & B.Tech. Branches)

L T P C

3 0 0 3

OBJECTIVES

- To build vocabulary proficiency and familiarity with varied lexical and contextual usages.
- To strengthen grammatical accuracy for effective sentence construction and language application.
- To develop clarity and coherence in written communication across academic and business contexts.
- To enhance oral fluency, confidence, and interactive communication skills.
- To promote efficient reading strategies for comprehension, analysis, and note-making.

UNIT I VOCABULARY

8

Synonyms and Antonyms - Word Formation - Sentence Types (declarative, imperative, interrogative & exclamatory) - Single Word Substitutes - Use of Abbreviations and Acronyms - Homonyms and Homophones - Collocation - British and American Vocabulary.

UNIT II GRAMMAR

10

Parts of speech - Be, Have and Do verbs - Punctuation - Tenses - Numerical Adjectives - modal verbs - Single line Definition - Direct and Indirect Speech - Gerunds and Infinitives - Same Word Used as Different Parts of Speech.

UNIT III WRITING

9

Letter Writing - Business communications - quotations, placing orders, complaints, replies to queries from business customers - Dialogue Writing - Paragraph Writing (descriptive, narrative, expository & persuasive) - Essay Writing - Writing Instructions.

UNIT IV SPEAKING

9

Self-introduction - Giving personal and factual information - Talking about present circumstances, past experiences and future plans - Expressing opinions and justifying opinions - Agreement / disagreement - Likes and dislikes - Tongue twisters

UNIT V READING SKILLS

9

Reading Comprehension - Reading techniques, pre-reading, post-reading, comprehension questions (multiple choice questions or short questions) - Short Comprehension Passages, practice skimming - Scanning and Predicting - Reading the passage and taking (Note making) Notes - Scan and understand main contents of the passage.

TOTAL: 45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Use a wide range of vocabulary effectively in oral and written communication.
- Frame grammatically and meaningful sentences.
- Write formal and informal letters, develop coherent paragraphs and essays, and engage in meaningful dialogues.
- Apply speaking skills for self-introduction, speeches, and technical presentations.
- Read, comprehend, and take organized notes from passages and technical content.

TEXT BOOKS

1. "Using English A Course book for Undergraduate Engineers and Technologists", Orient Black Swan Limited, Hyderabad, Board of Editors: 2015.
2. Richards, C. Jack, "Interchange Students' Book-2", 2015.

REFERENCES

1. Department of English, Anna University, "Mindscapes: English for Technologists and Engineers", First Edition, Orient Black Swan, 2012.
2. Krishna Mohan, Meera Banerji, "Developing Communication Skills", Paperback, MacMillan, 2019.

E-RESOURCES

1. <http://www.usingenglish.com>
2. <https://www.khanacademy.org/humanities/grammar>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	1	-	-	-	1	-	-	2	3	-	2	-	-
2	1	-	-	-	1	-	-	2	3	-	2	-	-
3	-	1	2	-	1	-	-	2	3	1	2	-	-
4	-	-	1	-	-	-	-	2	3	2	2	-	-
5	1	1	-	2	1	-	-	1	3	-	2	-	-
AVG.	1	1	1.5	2	1	-	-	1.8	3	1.5	2	-	-

1- Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS





23MAT101

MATRICES AND CALCULUS

L T P C

(Common to all B.E./ B.Tech. Branches)

3 1 0 4

OBJECTIVES

- To develop the use of matrix algebra and its properties.
- To explore the techniques of differential and integral calculus.
- To categorize methods for functions of several variables.
- To introduce the use of multiple integrals and their applications.
- To provide knowledge of vector calculus.

UNIT I MATRICES

9+3

Eigen values and Eigen vectors – Properties of Eigen values – Cayley-Hamilton theorem – Reduction of quadratic form to canonical form by orthogonal transformation – Nature of quadratic form.

UNIT II DIFFERENTIAL AND INTEGRAL CALCULUS

9+3

Differentiation rules: Derivatives of polynomials and exponential functions – The product and quotient Rules – Derivatives of trigonometric functions – The Chain rule – Implicit differentiation – Applications of differentiation: Maximum and Minimum Values – Techniques of integration: Integration by parts – Trigonometric integrals – Integration of rational functions by partial fractions.

UNIT III FUNCTIONS OF SEVERAL VARIABLES

9+3

Partial derivatives – Homogeneous functions – Euler's theorem – Total derivative – Jacobians – Taylor's theorem for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT IV MULTIPLE INTEGRALS

9+3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double integrals.

UNIT V VECTOR CALCULUS

9+3

Scalar and vector point functions – Gradient – Divergence and curl – Line integral – Surface integral – Green's theorem in a plane – Volume integral – Divergence theorem – Irrotational and Solenoidal fields.





OUTCOMES

Upon completion of the course, the students will be able to:

- Apply matrix algebra methods to solve practical problems.
- Apply the concepts of differential and integral calculus.
- Analyze the ideas of differential calculus for functions of several variables.
- Apply multiple integral ideas in solving areas and volumes.
- Solve the engineering problems using the concepts of vector calculus.

LIST OF EXPERIMENTS

1. Computation of Eigen values and Eigenvectors.
2. Matrix addition and multiplications.
3. Calculate differentiations of simple functions.
4. Calculate integrations of simple functions.
5. Determining Maxima and minima of functions for one variable.
6. Determining Maxima and minima of functions for two variables.
7. Evaluating double integral with constant limits.
8. Evaluating triple integral with constant limits.
9. Computing Gradient, divergence and curl of point functions.
10. Evaluating line integral in vector calculus.

TOTAL:45+15 PERIODS

TEXT BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, Fourty Third Edition, New Delhi, 2014.
2. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, Seventh Edition, New Delhi, 2015.

REFERENCES

1. Bali N.P, Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, Seventh Edition, 2009.
2. Kanti B. Dutta., "Mathematical Methods of Science and Engineering – Aided with MATLAB", Cengage Learning, New Delhi, Second Edition, 2013.

E-RESOURCES

1. <https://nptel.ac.in/courses/111105121> (Differential Calculus and Integral Calculus)
2. <https://nptel.ac.in/courses/111107112> (matrix analysis)





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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	-	-	-	-	-	-	-	2	-	-
2	3	3	2	-	-	-	-	-	-	-	2	-	-
3	3	3	2	-	-	-	-	-	-	-	2	-	-
4	3	3	2	-	-	-	-	-	-	-	2	-	-
5	3	3	2	-	-	-	-	-	-	-	2	-	-
AVG.	3	3	2	-	-	-	-	-	-	-	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation

[Signature]
Chairman - BoS





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23HST102

HERITAGE OF TAMILS

L T P C

(Common to All Branches)

1 0 0 1

OBJECTIVES

- To familiarize the students on extensive literature of classical Tamil.
- To analyze rock art paintings to modern art.
- To acquire knowledge on folk and martial arts.
- To apply the concepts of Thina in Tamils.
- To realize the contribution of Tamils in Indian freedom struggle.

UNIT I LANGUAGE AND LITERATURE

3

Language Families in India - Dravidian Languages –Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT II HERITAGE-ROCK ART PAINTINGS TO MODERN ART–SCULPTURE

3

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III FOLK AND MARTIAL ARTS

3

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV THINAI CONCEPT OF TAMILS

3

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.





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UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE

3

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India- Self-Respect Movement- Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL: 15 PERIODS

OUTCOMES

Upon the completion of the course, the students will be able to:

- Analyze the extensive literature Tamil and classical nature.
- Understand the heritage of sculpture, painting and musical instruments.
- Classify the folk and martial arts of Tamil people.
- Examine Thinaï concepts, trade and victory of Chozha dynasty.
- Interpret the contribution of Tamils in Indian freedom struggle, Self-esteem movement and siddha medicine.

TEXT-CUM-REFERENCE BOOKS

1. தமிழகவரலாறு – மக்களும் பண்பாடும் – கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் - முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்).
- 3.கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருதை -ஆற்றங்கரைநாகரீகம். (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)





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9. Keeladi – 'Sangam City Civilization on the banks of the river Vaigai' (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
10. Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	-	-	-	-	-	-	2	1	2	-	1	-	-
2	-	-	-	-	-	-	2	1	2	-	1	-	-
3	-	-	-	-	-	-	2	1	2	-	1	-	-
4	-	-	-	-	-	-	2	1	2	-	1	-	-
5	-	-	-	-	-	-	2	1	2	-	1	-	-
AVG.	-	-	-	-	-	-	2	1	2	-	1	-	-

1-Low 2-Medium 3-High '-' – No Correlation


Chairman - BoS





23HST102

தமிழர் மரபு

LTPC

(அனைத்து துறைகளுக்கும்
பொதுவானது)

1001

நோக்கங்கள்:

மாணவர்கள் கண்டிப்பாக அறிய வேண்டுவன:

- செம்மொழியான தமிழ்மொழியின் விரிவான இலக்கியத்தைப் பற்றி அறிதல்.
- பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை உள்ள கலைகளை பகுப்பாய்வு செய்தல்.
- நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகளைப்புரிந்து கொள்ளுதல்.
- தமிழர்களின் திணைக்கோட்பாடுகளைச் செயல்படுத்துதல்.
- இந்திய விடுதலைப் போராட்டத்திற்கும் பண்பாட்டிற்கும் தமிழர்களின் பங்களிப்பை உணருதல்.

அலகு 1 மொழிமற்றும் இலக்கியம்

3

இந்திய மொழிக்குடும்பங்கள் - திராவிடமொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ்செவ்விலக்கியங்கள் -சங்க இலக்கியத்தின் சமயச்சார்பற்றதன்மை - சங்கஇலக்கியத்தில் பகிர்தல் அறம்- திருக்குறளில் மேலாண்மைக் கருத்துக்கள்- தமிழக்காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின்தாக்கம்- பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் -தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு II மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக்கலை

3

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன்சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப்பொருட்கள், பொம்மைகள் - தேர்செய்யும்கலை - சுடுமண்சிற்பங்கள் -





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நாட்டுப்புறத்தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை -
இசைக்கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் -
தமிழர்களின் சமூகபொருளாதார வாழ்வில்கோவில்களின்பங்கு.

அலகு III நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள் 3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான்கூத்து, ஓயிலாட்டம்,
தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம்,
தமிழர்களின் விளையாட்டுகள்.

அலகு IV தமிழர்களின் திணைக்கோட்பாடுகள் 3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும்
சங்க இலக்கியத்தில் அகம் மற்றும் புறக்கோட்பாடுகள் - தமிழர்கள்
போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில்
எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறைமுகங்களும் -
சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல் கடந்த நாடுகளில்
சோழர்களின் வெற்றி.

**அலகு V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத்
தமிழர்களின் பங்களிப்பு 3**

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின்
பிறப்பகுதிகளில் தமிழ்ப்பண்பாட்டின்தாக்கம் - சுயமரியாதை இயக்கம்
- இந்திய மருத்துவத்தில் சித்தமருத்துவத்தின்பங்கு - கல்வெட்டுகள்,
கையெழுத்துப்படிக்கைகள் - தமிழ்ப் புத்தகங்களின் அச்சுவரலாறு.

TOTAL: 15 PERIODS

முடிவுகள்:

பாடத்தின் முடிவில், மாணவர்கள் அறிந்து கொள்வன:

- தமிழ்மொழியின் செம்மொழிதன்மையையும் சங்க இலக்கியத்தின் முக்கியத்துவத்தையும் உணர்வார்கள்.
- தமிழர்களின் சிற்ப, ஓவிய, இசைமரபுகளைப் புரிந்துகொள்வார்கள்.
- நாட்டுப்புறக் கலைகளையும் வீரவிளையாட்டுகளையும் வகைப்படுத்துவார்கள்.





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- தமிழர்களின் திணைக்கோட்பாடுகளும் சங்ககாலவர்த்தகமும் புரிந்து கொள்வார்கள்.
- இந்திய விடுதலைப் போராட்டம், சுயமரியாதை இயக்கம், சித்தமருத்துவம் ஆகியவற்றில் தமிழர்களின் பங்களிப்பை விளக்குவார்கள்.

உரைமற்றும் குறிப்புத்தகங்கள்:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன்பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகரநாகரிகம் (தொல்லியல்துறை வெளியீடு)
4. பொருநை - ஆற்றங்கரைநாகரீகம். (தொல்லியல்துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of the river Vaigai' (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
10. Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) - Reference Book.





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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	-	-	-	-	-	-	2	1	2	-	1	-	-
2	-	-	-	-	-	-	2	1	2	-	1	-	-
3	-	-	-	-	-	-	2	1	2	-	1	-	-
4	-	-	-	-	-	-	2	1	2	-	1	-	-
5	-	-	-	-	-	-	2	1	2	-	1	-	-
AVG.	-	-	-	-	-	-	2	1	2	-	1	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS





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23PHT101

ENGINEERING PHYSICS

L T P C

(Common to Civil, Mechanical, R & A and Pharm.Tech)

3 0 0 3

OBJECTIVES

- To impart knowledge of the structure of crystalline materials using crystallographic techniques.
- To enable students to understand the concepts of elasticity, plasticity, stress, and strain and their significance in industrial applications.
- To introduce the fundamentals of ultrasonics and sound waves, along with their practical engineering applications.
- To explain complex physical phenomena through the principles of quantum mechanics and Schrödinger's wave equation.
- To provide an understanding of the modes of heat transmission, thermal conduction in solids, and their engineering applications.

UNIT I CRYSTAL PHYSICS

9

Lattice and Unit cell – Crystal Systems and Bravais lattice – Lattice planes – Miller Indices – d - Spacing in Cubic lattice – Calculation of Number of Atoms per Unit Cell – Atomic radius, Coordination Number, Packing factor for SC, BCC, FCC and HCP structures – Crystal Growth Techniques: Melt Growth Techniques (Bridgman and Czochralski).- Silicon chip Production Process.

UNIT II MECHANICAL PROPERTIES OF SOLIDS & FLUIDS

9

Elasticity – Stress-Strain Diagram and its Uses - Factors Affecting Elastic Modulus – Torsional Stress and Deformations – Twisting Couple - Torsion Pendulum: Theory and Experiment - Bending of beams - Bending Moment – Cantilever: Theory and Experiment – Non-Uniform Bending: Theory and Experiment - I-Shaped Girders.

UNIT III ACOUSTICS & ULTRASONICS

9

ACOUSTICS : Classification of Sound – Decibel - Weber Fechner Law- Reverberation-Sabine's formula (Concept only) - Factors affecting Acoustics of Buildings and their Remedies.

ULTRASONICS: Properties -Production of Ultrasonics - Magnetostriction and Piezoelectric methods - Non Destructive Testing – Pulse echo system, through Transmission and Reflection modes.

UNIT IV QUANTUM PHYSICS

9

Black Body Radiation – Planck's Theory (derivation) – Electron Diffraction – Wave function and its Physical significance – Schrödinger's Wave Equations: Time independent and time dependent equation - Scanning Electron Microscope - Transmission Electron Microscope - Quantum Tunneling & Scanning Tunneling Electron Microscope.





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UNIT V THERMAL PHYSICS

9

Transfer of Heat Energy – Thermal expansion of Solids and Liquids – Expansion joints - Bimetallic strips - Thermal Conduction, Convection and Radiation – Heat conduction in Solids (Parallel & Series)– Thermal Conductivity Lee's disc method: Theory and Experiment - Geothermal Energy - Geothermal power - Thermal battery - Thermal Energy Storage.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Apply crystallographic concepts and techniques to identify the structure of crystalline solids.
- Analyze the mechanical properties of solids and fluids.
- Explain the fundamentals of sound waves and ultrasonic's and their engineering applications.
- Analyze the principles of quantum mechanics and Schrödinger's wave equation to identify complex physical phenomena.
- Analyze the concept of thermal conductivity and its engineering applications.

TEXT BOOKS

1. Mani P, "A Text book of Engineering Physics", Dhanam Publications, 2018.
2. Rajendran V. "Engineering Physics". TaTa McGraw Hill Publications, 2016.
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, "Concepts of Modern Physics", McGrawHill, 2017.

REFERENCES

1. Askeland D. "Materials Science and Engineering", Brooks/Cole, 2015.
2. Wahab M.A. "Solid State Physics: Structure and Properties of Materials", Narosa Publishing House, 2017
3. Thyagarajan K and Ghatak A. "Lasers: Fundamentals and Applications", Laxmi Publications, (Indian Edition), 2019
4. Halliday D, Resnick R and Walker J. "Principles of Physics", Wiley (Indian Edition), 2019

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/122/107/122107035/>
2. <https://archive.nptel.ac.in/courses/115/101/115101107/>





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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	1	1	-	-	-	-	-	-	-	-	-
2	3	3	1	1	-	-	-	-	-	-	-	-	-
3	3	3	1	1	-	-	-	-	-	-	-	-	-
4	3	3	1	1	-	-	-	-	-	-	-	-	-
5	3	3	1	1	-	-	-	-	-	-	-	-	-
AVG.	3	3	1	1	-	-	-	-	-	-	-	-	-

1-Low 2-Medium 3-High '-' – No Correlation


Chairman - BoS





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23CYT102

CHEMISTRY FOR ENGINEERS
(Common to CIVIL, MECH and R&A)

L T P C
3 0 0 3

OBJECTIVES

- To apply water quality analysis and treatment methods for industrial applications.
- To explain the classification, properties, manufacture, and applications of fuels.
- To utilize spectroscopic and chromatographic techniques for chemical analysis.
- To familiarize students with the principles of energy conversion in nuclear reactors, solar cells, batteries, and fuel cells.
- To apply electrochemical principles to understand corrosion and corrosion control methods.

UNIT I WATER TECHNOLOGY

9

Introduction - Characteristics – Hardness – Estimation of hardness by EDTA method – Alkalinity and its estimation - Boiler feed water – Requirements –Boiler troubles (Scale and Sludge) – Internal conditioning (phosphate, calgon and carbonate conditioning methods) – External conditioning – Zeolite process, Demineralization process – Desalination of brackish water by reverse osmosis.

UNIT II FUELS AND COMBUSTION

9

Fuels: Introduction - Classification of fuels - Coal - Carbonization - Manufacture of metallurgical coke (Otto Hoffmann method) - Petroleum – Manufacture of synthetic petrol (Bergius process) - Knocking - Octane number - Diesel oil - Cetane number –Natural gas - Compressed Natural Gas (CNG) - Power Alcohol and Biodiesel. Combustion of fuels: Introduction - Calorific value - Higher and lower calorific values- Ignition temperature - Spontaneous ignition temperature – Explosive range - Flue gas analysis (ORSAT Method).

UNIT III ANALYTICAL CHEMISTRY

9

Spectroscopy: Electromagnetic spectrum-Absorption of radiation –Electronic, Vibrational and rotational transitions. UV-Visible and IR Spectroscopy-Principles, instrumentation (Block Diagram Only).-Chromatography- General principles - classification - Gas chromatography – High Pressure Liquid Chromatography –Applications.

UNIT IV ENERGY SOURCES AND STORAGE DEVICES

9

Nuclear Fission – Controlled nuclear fission – Nuclear fusion – Differences between nuclear fission and fusion – Nuclear chain reactions – Nuclear energy – Light water nuclear power plant – Breeder reactor – Solar energy conversion – Solar cells - Wind energy. Batteries - Types of batteries –lead acid battery, lithium-ion-battery Fuel Cells - H_2 - O_2 fuel cell.

UNIT V ELECTROCHEMISTRY, CORROSION AND ITS CONTROL

9

Introduction- Electrochemical cells, applications of electrochemical series-Reference Electrode-standard calomel electrode, ion selective electrode, glass electrode, Corrosion – Types –





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Chemical Corrosion – Electrochemical Corrosion (galvanic and differential aeration) - Factors influencing corrosion – Material selection and design aspects-Control methods of corrosion – sacrificial anodic and impressed current cathodic protection.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Explain the quality parameters of water and suitable methods for removing impurities in domestic and industrial applications.
- Interpret the characteristics of fuels and their role in efficient and eco-friendly combustion systems.
- Analyze the interaction of light with matter and the use of analytical techniques to characterize molecules.
- Explain the energy resources and their applications in the energy sector.
- Analyze the causes of corrosion and effective methods for its prevention and control.

TEXT BOOKS

1. Jain P.C and Monika Jain, "Engineering Chemistry", Second Edition, Dhanpet Rai Publishing Company (P) Ltd., New Delhi, 2015.
2. R.Gopalan, "Analytical Chemistry" Sultan Chand & Sons, Third Edition, 2017.

REFERENCES

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", Tenth Edition, S. Chand & Company Ltd, New Delhi, 2015.
2. Shobha Ramakrishnan, Banani Mukhopadhyay, "Essentials of Analytical Chemistry" Third Edition, Pearson Education India, 2018.

E-RESOURCES

1. <https://nptel.ac.in/courses/104105084>
2. <http://library.iitbbs.ac.in/open-access-e-resources.php>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	2	1	3	-	1	-	3	-	-	-	-	-	-
2	2	2	3	2	1	2	2	2	2	1	2	-	-
3	3	3	3	3	3	2	2	2	2	2	3	-	-
4	2	2	2	3	3	2	2	1	1	1	-	-	-
5	3	2	3	2	3	2	1	2	1	-	2	-	-
AVG.	2.40	2.00	2.80	2.00	2.20	2.00	2.00	1.75	1.5	1.3	2.3	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS





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TIRUCHENGODE- 637 205



23GEE101

PROGRAMMING IN C (Lab Embedded Theory Course)

L T P C
3 0 2 4

OBJECTIVES

- To impart fundamental knowledge of C programming concepts, syntax, data types, operators, control structures, and program development.
- To develop students' understanding of arrays, strings, searching, and sorting techniques for solving computational problems.
- To train students in designing modular programs using functions, recursion, pointers, and parameter passing mechanisms.
- To familiarize students with structures, unions, dynamic memory allocation, and their applications in software development.
- To enable students to perform file handling operations and develop efficient C programs using sequential and random file processing.
- To develop C programs to solve real-world programming problems.

UNIT I BASICS OF C PROGRAMMING

9

Introduction to programming paradigms – Structure of C program – C programming: Data Types– variables–Storage classes – Constants – Enumeration Constants – Keywords – Operators: Precedence and Associativity – Expressions –Input/Output statements, Assignment statements – Decision making statements – Switch statement – Looping statements – Pre-processor directives – Compilation process.

Coding practices:

1. Develop a program to find the largest of three numbers using nested if statements.
2. Develop a program to generate multiplication tables using loops.

Problem - solving assignments:

1. Write a program to calculate the area and perimeter of a rectangle, circle, and triangle.
2. Write a program to calculate simple interest and compound interest.

UNIT II ARRAYS AND STRINGS

9

Introduction to Arrays: Declaration, Initialization – One dimensional array – Example Program: Computing Mean, Median and Mode – Two dimensional arrays – Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) – String operations: length, compare, concatenate, copy –Sorting – Selection sort, Insertion sort, Merge sort, quick sort – Searching – linear and binary search.

Coding practices:

1. Develop a program to perform matrix addition and transpose using two-dimensional arrays.
2. Write a program to sort an array using Insertion Sort.





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Problem - solving assignments:

1. Develop a program to perform matrix operations such as addition and transpose using two-dimensional arrays.
2. Write a program to search for an element in an array using Linear Search and Binary Search.

UNIT III FUNCTIONS AND POINTERS

9

Introduction to functions: Function prototype, function call, Built-in functions (string functions, math functions) – Recursion – Example Program: Computation of Sine series, Scientific calculator using built-in functions – Pointers – Pointer operators – Arrays and pointers – Example Program: Sorting of names – Parameter passing: Pass by value, Pass by reference – Example Program: Swapping of two numbers and changing the value of a variable using pass by reference.

Coding practices:

1. Develop a recursive program to generate the Fibonacci series.
2. Develop a program to implement a scientific calculator using built-in mathematical functions.

Problem - solving assignments:

1. Write a program to perform arithmetic operations using user-defined functions.
2. Write a program to swap two numbers using pass-by-value and pass-by-reference.

UNIT IV STRUCTURES AND UNION

9

Structure – Example Programs – Nested structures – Pointer in Structures – Array of structures Example Program using structures and pointers – Self referential structures – Dynamic memory allocation, Union- Storage classes.

Coding practices:

1. Develop a program to generate an employee salary slip using structures and pointers.
2. Develop a program using nested structures to represent student academic details.

Problem - solving assignments:

1. Write a program to store and display employee details using an array of structures.
2. Develop a program to demonstrate dynamic memory allocation using structures.

UNIT V FILE PROCESSING

9

Files – Operations of File – Types of file processing: Sequential access, Random access – Sequential access file – Random access file – Command line arguments.

Coding practices:

1. Write a program to create, write, and read a text file.
2. Develop a program to copy the contents of one file to another.

Problem - solving assignments:

1. Write a program to create, write, and read student records using sequential file processing.
2. Write a program to implement command-line arguments for performing arithmetic operations or file processing.





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LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Programs using I/O statements, expressions and decision-making constructs.
2. Write a program to find whether the given year is leap year or Not.
3. Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of a number.
4. Check whether a given number is Armstrong number or not?
5. Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions.
 - a) 5 if it is a perfect cube.
 - b) 4 if it is a multiple of 4 and divisible by 6.
 - c) 3 if it is a prime number.
6. Populate an array with height of persons and find how many persons are above the average height.
7. From a given paragraph perform the following using built-in functions:(i)Find the total number of words.(ii) Capitalize the first word of each sentence.(iii)Replace a given word with another word.
8. Solve towers of Hanoi using recursion.
9. Locate and Display the Contents of an Array using Pointers.
10. Generate salary slip of employees using structures and pointers.
11. Count the number of account holders whose balance is less than the minimum balance using sequential access file.

TOTAL: 45 +15 = 60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Explain the fundamental concepts of C programming and develop programs using data types, operators, expressions, and control structures.
- Develop C programs using arrays, strings, searching, and sorting techniques to solve computational problems.
- Construct modular C programs by applying functions, recursion, pointers, and parameter passing techniques.
- Develop applications using structures, unions, pointers, and dynamic memory allocation for efficient data organization and manipulation.
- Analyze file processing techniques using sequential and random access methods to perform data storage and retrieval operations.
- Develop reliable software solutions using C programming for real-world applications.

TEXT BOOKS

1. E.Balagurusamy, "Programming in ANSI C", Tata McGraw Hill, Eighth Edition, 2019.
2. Kernighan, B.W and Ritchie, D.M, "The C Programming Language", Second Edition, Pearson Education, 2006.





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REFERENCES

1. ReemaThareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Juneja, B. L and Anita Seth, "Programming in C", CENGAGE Learning India pvt.Ltd., First Edition, 2011.

E – RESOURCES

1. <https://nptel.ac.in/courses/106/105/106105085/> (Introduction to C Programming)
2. <https://nptel.ac.in/courses/106/106/106106210/> (File operations)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	–	3	–	–	–	–	–	2	–	1
2	3	3	2	1	3	–	–	–	–	–	2	–	1
3	3	3	3	2	3	–	–	–	–	–	2	–	1
4	3	3	3	2	3	–	–	–	1	–	2	–	1
5	2	3	2	2	3	–	–	–	1	–	2	–	1
6	3	3	3	2	3	–	1	1	2	1	2	–	1
AVG.	2.83	2.83	2.5	1.8	3.0	–	1.0	1.0	1.33	1.0	2	–	1.0

1 - Low 2 - Medium 3 - High, "–" - No Correlation


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23CEL101

REVERSE ENGINEERING LABORATORY

L T P C

0 0 4 2

OBJECTIVES

- To familiarize with the analyze, dismantle, and reassemble engineering components and systems to understand their design, function, and manufacturing principles through practical reverse engineering techniques.

LIST OF EXPERIMENTS

1. Dismantling and Assembly of a PVC and GI Pipes
2. Make Tee-Lap Joints for the given Work pieces to the required shape and dimensions.
3. Make Dovetail Joints for the given Work pieces to the required shape and dimensions.
4. Make Mortise and Tenon Joints for the given Work pieces to the required shape and dimensions.
5. Dismantling and Assembly of a Header Bond and Stretcher Bond in Brick Work.
6. Dismantling and Assembly of an English Bond and Flemish Bond in Brick Work.
7. Study on Nominal Properties of Steel (as per IS Code).

OUTCOMES

Upon completion of this course, the students will be able to:

- Apply engineering concepts to analyze the functioning of dismantled or deconstructed civil systems.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
Mapping Outcome	3	2	2	2	3	-	-	-	-	-	2	3	2

1-Low 2-Medium 3-High '-' – No Correlation

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23EEEC101

SOFTSKILLS & LIFE SKILLS

L T P C

(Common to all First year / First Semester B.E., B.Tech., Branches)

1 0 0 1

OBJECTIVES

- To understand the Universal Human Values
- To have an overview on Life skills required in their profession
- To manage the behavior with emotional intelligent skills
- To learn professional Skills required for 21st century
- To formulate and implement effective leadership strategies.

UNIT I UNIVERSAL HUMAN VALUES

3

Understanding harmony in the human being - understanding harmony in the family and society - understanding harmony in the nature and existence - understanding of harmony on professional ethics

UNIT II LIFE SKILLS

3

Soft Skills – Positive Attitude - Empathy - Effective Communication - Decision-Making Skills - Communication Skills - Problem Solving - Critical Thinking- Analytical thinking

UNIT III EMOTIONAL SKILLS

3

Self-Awareness - Interpersonal Relationship - Stress – Stress management - Focus and Self Control - Positive Thinking – Anger management

UNIT IV PROFESSIONAL SKILLS

3

21st century skills – Hard Skills - General computer skills - Spreadsheet proficiency - Career Skills - developing a long - term career plan – Team Work -- Time management

UNIT V LEADERSHIP SKILLS

3

Leadership, Levels of Leadership, Making of a leader, Types of leadership, describing a leadership style.

TOTAL: 15 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Treat and respect the human beings with harmony,
- Develop the capabilities needed to utilize their potential wherever required.
- Control their emotional feelings and manage the stress.
- Explore the career & professional skills.
- Become highly confident as a leader and find new ways of influencing the teams they lead.

TEXT BOOKS

1. Life Skills for Engineers, McGraw Hill Education (India) Private Ltd., 2016
2. E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015
3. Sydänmaanlakka Pentti. "Intelligent leadership and leadership competencies". Dissertation Series.





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REFERENCES

1. Barun K. Mitra; (2011), "Personality Development & Soft Skills", First Edition; Oxford Publishers.
2. Kalyana; (2015) "Soft Skill for Managers"; First Edition; Wiley Publishing Ltd.

E-RESOURCES

1. <https://uhv.org.in/>
2. <https://nptel.ac.in>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	1	1	-	-	-	2	2	3	2	1	-	-	-
2	1	3	1	1	-	1	-	2	3	3	1	-	-
3	-	1	-	-	-	1	-	3	3	3	1	-	-
4	2	2	1	1	3	1	-	2	3	3	3	-	-
5	1	1	1	-	-	2	-	3	3	3	3	-	-
AVG.	1.25	1.6	1	1	3	1.4	2	2.6	2.8	2.6	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation


Chairman - BoS





23MDC101

INDUCTION PROGRAMME (2 Weeks)

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have a broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character."

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

Physical Activity

This would involve a daily routine of physical activity with games and sports etc.

Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, make decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and don'ts, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.





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Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the underprivileged.

Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

References: Guide to Induction program from AICTE


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SEMESTER II

23MAT202	DIFFERENTIAL EQUATIONS AND NUMERICAL METHODS	L	T	P	C
	[Common to Civil, EEE, ECE and MDE]	3	1	0	4

OBJECTIVES

- To explore techniques for solving ordinary differential equations and recurrence relations.
- To compose the purpose of using Laplace transforms to create a new domain in which problems can be handled more easily.
- To develop the concepts of solving algebraic, transcendental and system of linear equations.
- To introduce the numerical techniques of interpolation and integration.
- To explain various numerical methods of solving ordinary differential equations.

UNIT I ORDINARY DIFFERENTIAL EQUATIONS AND RECURRENCE RELATIONS 9+3

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Legendre's linear equations – Simultaneous linear equations with constant coefficients – Recurrence relations: Solving linear homogeneous recurrence relations with constant coefficients.

UNIT II LAPLACE TRANSFORMS 9+3

Definition – Conditions for existence – Transforms of elementary functions – Properties of Laplace transforms – Transform of Periodic functions – Transforms of derivatives and integrals – Multiplication by 'tⁿ' and division by 't' – Evaluation of integrals by Laplace transforms – Inverse transforms – Convolution theorem – Application to solution of linear second order ordinary differential equations with constant coefficients.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3

Solution of algebraic and transcendental equations by Newton Raphson method – Solution of simultaneous algebraic equations by Gauss elimination, Gauss Jordan and Gauss Seidel methods – Matrix Inversion by Gauss Jordan method – Eigen values of a matrix by Power method.

UNIT IV INTERPOLATION AND NUMERICAL INTEGRATION 9+3

Interpolation with equal intervals: Newton's forward interpolation formula – Newton's backward interpolation formula – Interpolation with unequal intervals: Lagrange's interpolation formula – Divided differences – Newton's divided difference formula – Numerical integration: Trapezoidal rule – Simpson's one-third rule – Numerical double integration by Trapezoidal rule.





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UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

9+3

Taylor's series method – Euler's method – Modified Euler's method – Runge-Kutta method – Predictor-corrector methods: Milne's method – Adams-Bashforth method.

OUTCOMES

Upon completion of the course, the students will be able to:

- Apply appropriate techniques to solve ordinary differential equations and recurrence relations.
- Solve engineering problems using the concept of Laplace transforms.
- Compute the numerical solution of algebraic, transcendental and system of linear equations.
- Apply the numerical techniques of interpolation and integration.
- Evaluate the numerical solution of ordinary differential equations.

LIST OF EXPERIMENTS

1. Solving ordinary differential equations.
2. Compute homogeneous recurrence relations.
3. Calculate Laplace Transform of simple functions.
4. Calculate Inverse Laplace transform of a given function.
5. Solution of simultaneous algebraic equations by Gauss Seidel method.
6. Find the Eigen values of a matrix by Power method.
7. Illustrate Lagrange's interpolation formula.
8. Evaluation of line integral by Simpson's one-third rule.
9. Solving ordinary differential equations by Euler's method.
10. Solving ordinary differential equations by Runge-Kutta method.

TOTAL: 45+15 PERIODS

TEXT BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, Forty Fourth Edition, 2022.
2. Grewal, B.S., "Numerical Methods in Engineering and Science", Khanna Publishers, Eleventh Edition, 2023.

REFERENCES

1. Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, Tenth Edition, 2016.
2. Burden, R.L and Faires, J.D, "Numerical Analysis", Cengage Learning, Ninth Edition, 2016.





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E-RESOURCES

1. <https://archive.nptel.ac.in/courses/111/105/111105121/> (Ordinary differential equations)
2. <https://nptel.ac.in/courses/111106139> (Laplace transforms)
3. <https://nptel.ac.in/courses/111/107/111107105/> (Numerical Methods)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	2	2	-	-	-	-	-	2	-	-
2	3	3	2	2	2	-	-	-	-	-	2	-	-
3	3	2	2	1	2	-	-	-	-	-	2	-	-
4	3	2	2	1	2	-	-	-	-	-	2	-	-
5	3	2	2	1	2	-	-	-	-	-	2	-	-
AVG.	3	2.4	2	1.4	2	-	-	-	-	-	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation


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23PHT201

ADVANCED PHYSICS OF MATERIALS (Common to Civil, Mechanical, R & A and Pharm.Tech)

L T P C

3 0 0 3

OBJECTIVES

- To impart fundamental knowledge of cryogenics and superconductivity and their engineering applications.
- To provide understanding of various material characterization techniques and Non-Destructive Testing (NDT) methods.
- To introduce nanoscience concepts, nanomaterials, quantum structures and their synthesis techniques.
- To explain the principles, properties and applications of smart and advanced materials.
- To develop knowledge on composite materials, their constituents, properties and applications.

UNIT I CRYOGENICS

9

Introduction to Cryogenics - Properties of Cryogenic Fluids- Gas-Liquefaction of Gases and Refrigeration Systems – Cryocoolers -Cryogenic Insulations - Superconductivity: Properties (Electrical Resistance, Magnetic Property, Meissner effect, Persistent of Current, Effect of heavy Current, Isotope effect, Thermal properties) – Type I and Type II Superconductors – BCS theory of Superconductivity - High T_c superconductors – Applications of Superconductors: Josephson effect (AC & DC), Magnetic Levitation.

UNIT II MATERIALS CHARACTERIZATION

9

Introduction to materials and Techniques-X-Ray Diffraction (XRD) – Atomic Force Microscopy (AFM)- Fourier Transform Infrared Spectroscopy (FTIR)- UV-Vis Spectroscopy- Non-Destructive Testing (NDT) : Liquid Penetrant Test, Magnetic Detection, Electromagnetic Testing, Ultrasonic Test.

UNIT III NANOMATERIALS & NANODEVICES

9

Emergence of Nano science - Role of Particle Size - Quantum Structures: Quantum Well, Quantum Wire and Quantum Dot- Properties at Nano Scale (Optical, Electronic and Magnetic) - Synthesis of Nanomaterials: Physical Vapour Deposition (PVD) - Pulsed Laser Deposition (PLD) - Carbon Nanotubes: Types, Properties and applications - Micro Electro Mechanical Systems (MEMS).

UNIT IV SMART MATERIALS

9

Smart materials – Functional materials – Polyfunctional Materials – Structural Materials, Electrical Materials, Bio-Compatible Materials - Metallic Glasses: Properties, Types, Glass forming ability of Alloys, Melt spinning process, Applications - Shape Memory Alloys: Phases, Shape Memory Effect, Pseudo elastic effect, NiTi alloy, and applications.





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UNIT V COMPOSITE MATERIALS

9

Definitions, Composites, Reinforcements and Matrices, Types of Reinforcements, Types of Matrices, Types of Composites, Carbon Fibre Composites, Properties of Composites in Comparison with Standard Materials, Applications of Metal, Ceramic and Polymer matrix composites.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of this course, the students will be able to:

- Explain the principles of cryogenics and superconductivity and describe their properties and applications.
- Describe and interpret results from material characterization techniques and NDT methods.
- Explain nanoscale properties, quantum structures and identify suitable nanomaterial synthesis methods.
- Describe the behavior and applications of smart materials such as metallic glasses and shape memory alloys.
- Classify composite materials and compare their properties with conventional materials for engineering applications.

TEXT BOOKS

1. Mani P, "A Text book of Engineering Physics ", Dhanam Publications, 2018.
2. Rajendran V, "Engineering Physics", TaTa McGraw Hill Publications, 2017.
3. Sam Zhang, Lin Ki, Ashok Kumar, "Materials Characterization Techniques", CRC Press, Taylor & Francis Group, 2019.

REFERENCES

1. Askeland D, "Materials Science and Engineering", Brooks/Cole, 2015.
2. Wahab M.A. "Solid State Physics: Structure and Properties of Materials", Narosa Publishing House, 2017.
3. Santhana Ragavan P and Ramasamy P, "Crystal Growth Processes and Methods", KRU Publications, 2017.

E-RESOURCES

1. <https://nptel.ac.in/courses/112108150/>
2. https://swayam.gov.in/nd1_noc19_mm13/preview





Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	1	1	-	-	-	-	-	-	-	-	-
2	3	2	1	1	-	-	-	-	-	-	-	-	-
3	3	2	1	1	-	-	-	-	-	-	-	-	-
4	3	2	1	1	-	-	-	-	-	-	-	-	-
5	3	2	1	1	-	-	-	-	-	-	-	-	-
AVG.	3	2	1	1	-	-	-	-	-	-	-	-	-

1-Low 2-Medium 3-High '-' – No Correlation

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23CYT201

ENVIRONMENTAL SCIENCE AND SUSTAINABILITY

(Common to All B.E. /B.Tech. Branches)

L T P C

3 0 0 3

OBJECTIVES

- To familiarize students with the concepts of environment, ecosystems, biodiversity, and their conservation.
- To create awareness about environmental pollution, individual responsibilities in pollution prevention, and basic disaster management.
- To impart knowledge about major social and environmental issues, environmental protection laws, and green chemistry principles.
- To analyze population-related issues, human health, social welfare, and the role of information technology in environmental and human health.
- To develop an understanding of sustainability concepts, climate change issues, and sustainable management practices for addressing environmental challenges.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

9

Definition, scope and importance of environment – Need for public awareness - Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (d) aquatic ecosystems (oceans) – Introduction to biodiversity definition: genetic, species and ecosystem diversity –Value of biodiversity – Threats to biodiversity – Endangered and endemic species of India – Conservation of biodiversity: In-Situ and Ex-Situ conservation of biodiversity.

Activity: Biodiversity in and around the campus and report submission.

UNIT II ENVIRONMENTAL POLLUTION

9

Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution – Solid waste management: causes, effects and control measures of municipal solid wastes - E-waste – Role of an individual in prevention of pollution - Pollution case studies – Disaster management: floods, earthquake and cyclone.

Activity: Local pollution case study and report submission.

UNIT III SOCIAL ISSUES AND THE ENVIRONMENT

9

Water conservation, rain water harvesting, watershed management – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – Green Chemistry and principles - Environment production act – Air (Prevention and Control of Pollution) act –Water (Prevention and control of Pollution) act

Activity: Creating environmental awareness.





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UNIT IV HUMAN POPULATION AND THE ENVIRONMENT

9

Population growth, variation among nations – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education – HIV / AIDS – Women and child welfare – Role of information technology in environment and human health – Case studies.

Activity: Visit to local primary health center.

UNIT V SUSTAINABLE MANAGEMENT

9

Sustainability-Concept, needs and challenges-economic, social and aspects of sustainability-From unsustainability to sustainability--Sustainable Development Goals-Targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-Case studies. Zero waste, Material Life cycle assessment, Sustainable habitat: Energy efficiency, Sustainable transports.

Activity: Field trips to local organizations or facilities with sustainable practices in place.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Explain the basics of environment, ecosystems, biodiversity, and conservation.
- Identify major sources of pollution and understand individual responsibilities in pollution prevention and disaster management.
- Describe key social and environmental issues, environmental laws, and green chemistry principles.
- Analyse population growth, human health, social welfare, and the role of IT in environmental and health management.
- Apply sustainability concepts, climate change mitigation, and sustainable management practices to environmental challenges.

TEXT BOOKS

- 1 Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, 2019.
- 2 Gilbert M.Masters, "Introduction to Environmental Engineering and Science", Eighth Edition, Pearson Education, 2021.
- 3 Allen, D. T. and Shonnard, D. R., "Sustainability Engineering: Concepts, Design and Case Studies", Third Edition, Prentice Hall, 2018.

REFERENCES

1. Erach Bharucha, "Textbook of Environmental Studies", Universities Press (I) Pvt Ltd, 2016.
2. Dharmendra S. Sengar, "Environmental law", Prentice hall of India Pvt Ltd, 2018.
3. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2019.





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E-RESOURCES

1. <https://nptel.ac.in/courses/122102006/>
2. https://swayam.gov.in/nd1_noc19_ge22/preview

Mapping of COs-POs & PSOs

CQ	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	2	2	3	-	-	3	3	-	-	2	1	-	-
2	2	2	3	2	3	3	3	-	-	3	3	-	-
3	2	1	3	2	2	3	3	-	2	3	3	-	-
4	2	1	3	2	3	3	3	2	3	2	2	-	-
5	2	1	3	2	3	3	3	2	3	2	2	-	-
AVG	2	1.4	3	1.6	2.2	3	3	0.8	1.6	2.4	2.2	-	-

1 - Low 2 - Medium 3 - High '-' - No Correlation

Chairman - BoS





23CET201

APPLIED MECHANICS

LTPC

3104

OBJECTIVES

- To inculcate the particle, body, force and their equilibrium conditions.
- To familiarize the concept of equilibrium of rigid bodies.
- To impart knowledge on the surfaces and solids.
- To develop the basic concepts of friction.
- To acquire the dynamics concepts of force, momentum, work and energy

UNIT I STATICS OF PARTICLES

9+3

Introduction – Laws of Mechanics – Parallelogram and Triangular Law of forces – Principle of Transmissibility – Force system – Resolution of force –Free body diagram–Equilibrium of a particle in plane – Forces in space – Equilibrium of a particle in space.

UNIT II STATICS OF RIGID BODIES

9+3

Moments: Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar component of moments – Varignon's theorem– Equivalent systems of forces – Single equivalent force. Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions.

UNIT III PROPERTIES OF SURFACES AND SOLIDS

9+3

First moment of area and Centroid of sections – T section- I section- Angle section- Hollow section from primary simpler sections – Second moment of plane areas – Parallel axis theorem and Perpendicular axis theorem – T section – I section- Angle section- Hollow section –Product of Inertia- Principal Moment of Inertia of plane area- Mass moment of inertia.

UNIT IV FRICTION

9+3

Surface Friction – Laws of dry friction – Angle of friction & Angle of repose – Sliding friction – Static and Kinetic friction– Ladder friction – Wedge friction – Belt friction. Rectilinear motion of particles.

UNIT V DYNAMICS OF PARTICLES AND KINEMATICS OF RIGID BODY

9+3

Dynamics of Particles: Newton's law, Work – Energy and Impulse – Momentum equations of particles – Impact of elastic bodies. Kinematics of Rigid body: Translation – Rotation about a fixed axis

TOTAL: 45 +15=60 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the forces in vector components (both 2D and 3D) and apply equilibrium conditions.
- Examine the moment produced by various force systems and conclude the static equilibrium equations for rigid body system.
- Identify the centroid, centre of gravity and moment of inertia of geometrical shapes and solids respectively.
- Examine the effect of dry friction and its applications.
- Apply the different principles to study the motion of a body and their constitutive equations.

TEXT BOOKS

- Beer F.P and Johnston Jr. E.R, "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", Tata McGraw Hill Publishing company, Tenth Edition, 2020.
- Kumar K.L, "Engineering Mechanics", Tata McGraw-Hill Publishing company, Fourth Edition, 2019.
- Vela Murali, "Engineering Mechanics", Oxford University Press, Second Edition, 2019.

REFERENCES

- Hibbeler R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", Pearson Education, Fourteenth Edition, 2021.
- Meriam J L and Kraige L G, "Engineering Mechanics: Statics and Engineering Mechanics: Dynamics", Wiley student edition, Seventh Edition, 2019.
- Boresi P and Schmidt J, "Engineering Mechanics: Statics and Dynamics", Cengage learning, First Edition, 2020.

E-RESOURCES

- [https://nptel.ac.in/courses/122/104/122104015/\(Engineering Mechanics\)](https://nptel.ac.in/courses/122/104/122104015/(Engineering%20Mechanics))
- <https://www.courses.com/indian-institute-of-technology-guwahati/engineering-mechanics> (Engineering Mechanics)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	2	-	-	-	-	-	-	-	3	3
2	3	3	2	2	-	-	-	-	-	-	-	3	3
3	3	3	2	2	-	-	-	-	-	-	-	3	3
4	3	3	2	2	-	-	-	-	-	-	-	3	3
5	3	3	2	2	-	-	-	-	-	-	-	3	3
AVG.	3	3	2	2	-	-	-	-	-	-	-	3	3

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BOS





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TIRUCHENGODE- 637 205



23GET201

ENGINEERING GRAPHICS

(Common to Mech, Civil and Robotics Department)

L T P C

3 1 0 4

OBJECTIVES

- To introduce the fundamental principles of engineering graphics, drawing instruments, and construction of plane curves.
- To teach methods for projecting points, lines, and plane surfaces, including determination of true lengths and inclinations.
- To explain projection techniques of simple solids and handling axes inclined to reference planes using change of position method.
- To train learners in sectioning of solids and development of lateral surfaces of regular and truncated solids.
- To present conversion between orthographic and isometric projections and their practical applications in engineering drawing.

UNIT I PLANE CURVES

9+3

Principles of Engineering Graphics and their significance, usage of Drawing instruments, Types of Lines, Dimensioning Systems as per BIS conventions. **(Not for Examination)**

Construction of ellipse – Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES

9+3

Projection of points – Projection of straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to one reference planes.

UNIT III PROJECTION OF SOLIDS

9+3

Projections of solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT IV SECTION OF SIMPLE SOLIDS AND DEVELOPMENT OF SURFACES

9+3

Sectioning of simple solids like prisms and cone - Inclined to one reference plane. Development of lateral surfaces of simple and truncated solids: pyramids and cylinders.

UNIT V ORTHOGRAPHIC AND ISOMETRIC PROJECTIONS

9+3

Conversion of isometric projection into orthographic projection, Conversion of orthographic projection into isometric projection.

TOTAL : 45+15=60 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Construct multiple views of engineering components.
- Construct the pictorial drawings as per the standards.
- Develop the projection of solids.
- Draw the section of solids drawings and development of surfaces of given objects.
- Apply free hand sketching and concept of isometric in engineering practice.

TEXT BOOKS

1. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, Fourth Edition, 2019.
2. Natarajan K.V., "Engineering Graphics", Dhanalakshmi Publishers, Thirty Second Edition, 2019.

REFERENCES

1. K.R. Gopalakrishna, "Engineering Drawing Volume 1 & 2", Subhas Publications, Thirteenth Edition, 2021.
2. T.Jeyapoovan. "Engineering Graphics using Auto CAD" Vikas publishing house Pvt Ltd, Sixth Edition, 2022

E- RESOURCES

1. <https://nptel.ac.in/courses/112/103/112103019/> - (Geometric Constructions)
2. <https://nptel.ac.in/courses/105/104/105104148/> - (Projections)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	-	3	1	-	-	-	-	2	2	-
2	3	2	2	-	3	1	-	-	-	-	2	2	-
3	3	2	2	-	3	1	-	-	-	-	2	2	-
4	3	2	2	-	3	1	-	-	-	-	2	2	-
5	3	2	2	-	3	1	-	-	-	-	2	2	-
AVG.	3	2	2	-	3	1	-	-	-	-	2	2	-

1 - Low 2 - Medium 3 - High '-' - No Correlation


Chairman - BoS





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TIRUCHENGODE- 637 205



23HST202

TAMILS AND TECHNOLOGY
(Common to All Branches)

L T P C
1 0 0 1

OBJECTIVES

- To gain knowledge about weaving and ceramic Technology
- To create a design and construction Technology
- To analyze manufacturing Technology
- To apply agriculture and irrigation Technology
- To remember scientific and scientific Tamil and Tamil computing

UNIT I WEAVING AND CERAMIC TECHNOLOGY

3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY

3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo -Saracenic architecture at Madras during British Period.

UNIT III MANUFACTURING TECHNOLOGY

3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads - Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY

3

Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing Knowledge of Sea - Fisheries- Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING

3

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

TOTAL: 15 PERIODS





OUTCOMES

Upon the completion of the course, the students will be able to:

- Understand weaving under ceramic Technology.
- Develop new design and construction Technology.
- Identify the manufacturing Technology.
- Understand agriculture and irrigation.
- Knowledge of scientific Tamil and Tamil computing.

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே. கே. பிள்ளை – (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் - முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்).
- 3.கீழடி – வைகை நதிக்கரையில் சங்ககால நகரநாகரிகம் (தொல்லியல்துறை வெளியீடு)
4. பொருறை –ஆற்றங்கரை நாகரீகம். (தொல்லியல்துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City Civilization on the banks of the river Vaigai' (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
10. Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.





Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	-	-	-	-	-	-	2	1	-	-	1	-	-
2	-	-	-	-	-	-	2	1	-	-	1	-	-
3	-	-	-	-	-	-	2	1	-	-	1	-	-
4	-	-	-	-	-	-	2	1	-	-	1	-	-
5	-	-	-	-	-	-	2	1	-	-	1	-	-
AVG.	-	-	-	-	-	-	2	1	-	-	1	-	-

1-Low 2-Medium 3-High '-' – No Correlation


Chairman - BQS





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23HST202

தமிழரும் தொழில்நுட்பமும்
(அனைத்து துறைகளுக்கும் பொதுவானது)

L T P C
1 0 0 1

நோக்கம்:

மாணவர்கள் கண்டிப்பாக அறிய வேண்டுவன:

- நெசவு மற்றும் பீங்கான் தொழில்நுட்பம் பற்றிய அறிவைப் பெறுதல்.
- வடிவமைப்பு மற்றும் கட்டுமான தொழில்நுட்பத்தை உருவாக்குதல்.
- உற்பத்தி தொழில் நுட்பத்தைப் பகுப்பாய்வு செய்தல்.
- விவசாயம் மற்றும் நீர்ப்பாசனத் தொழில்நுட்பத்தைப் பயன்படுத்துதல்.
- அறிவியல் மற்றும் அறிவியல் தமிழ் மற்றும் தமிழ் கணிப்பொறி தொடர்பான அறிவை நினைவில் கொள்ளுதல்.

அலகு 1 நெசவு மற்றும் பாணைதொழில்நுட்பம்

3

சங்ககாலத்தில் நெசவுத்தொழில் - பாணை தொழில்நுட்பம் - கருப்பு, சிவப்புபாண்டங்கள் - பாண்டுகளில் கீறல்குறியீடுகள்.

அலகு 2 வடிவமைப்பு மற்றும் கட்டிடத்தொழில்நுட்பம்

3

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்ககாலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு சங்ககாலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச்சிற்பங்கள், கோவில்களும் - சோழர் காலத்தாபெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத்தலங்கள் நாயக்கர்காலகோயில்கள் - மாதிரிகட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலைநாயக்கர்மஹால் - செட்டிநாட்டுவீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக்கலை.

அலகு 3 உற்பத்தித்தொழில்நுட்பம்

3

கப்பல் கட்டும்கலை - உலோகவியல் - இரும்புதொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடிகள் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடிமணிகள் - சுடுமண்மணிகள் - சங்குமணிகள் - எலும்புதுண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில்மணிகளின்வகைகள்.





அலகு 4 வேளாண்மை மற்றும் நீர்ப்பாசன தொழில்நுட்பம் 3
அணை, குளங்கள், மடகு - சோழர்கால குமுளிதாம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துகுளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார்சமூகம்.

அலகு 5 அறிவியல் தமிழ் மற்றும் கணித்தமிழ் 3
அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ்நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக்கல்விக்கழகம் - தமிழ்மின்னூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத்திட்டம்.

TOTAL: 15 PERIODS

முடிவுகள்:

பாடத்தின் முடிவில், மாணவர்கள் அறிந்து கொள்வன:

- பீங்கான் மற்றும் நெசவு தொழில்நுட்பத்தைப் புரிந்து கொள்ளுதல்.
- புதிய வடிவமைப்பு மற்றும் கட்டுமான தொழில்நுட்பத்தை உருவாக்குதல்.
- உற்பத்தித் தொழில்நுட்பத்தை அடையாளம் காணுதல்.
- விவசாயம் மற்றும் நீர்ப்பாசனத்தைப் புரிந்து கொள்ளுதல்.
- அறிவியல் தமிழ் மற்றும் தமிழ்கணிப்பொறி தொடர்பான அறிவை பெறுதல்.

உரை மற்றும் குறிப்பு புத்தகங்கள்:

1. தமிழகவரலாறு - மக்களும்பண்பாடும் - கே. கே. பிள்ளை- (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருறை - ஆற்றங்கரை நாகரீகம். (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of the river Vaigai' (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)





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TIRUCHENGODE- 637 205

10. Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay)
(Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu
Textbook and Educational Services Corporation, Tamilnadu.)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference
Book.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	-	-	-	-	-	-	2	1	-	-	1	-	-
2	-	-	-	-	-	-	2	1	-	-	1	-	-
3	-	-	-	-	-	-	2	1	-	-	1	-	-
4	-	-	-	-	-	-	2	1	-	-	1	-	-
5	-	-	-	-	-	-	2	1	-	-	1	-	-
AVG.	-	-	-	-	-	-	2	1	-	-	1	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS



23HSE201

ENGLISH FOR ENGINEERS:THEORY AND PRACTICE

LTPC

(Common to all B.E. & B.Tech. Branches)

3 0 2 4

OBJECTIVES

- To strengthen grammatical accuracy for effective communication.
- To develop listening and reading comprehension skills.
- To improve writing proficiency for academic and formal purposes.
- To train in business and professional correspondence.
- To enhance speaking abilities for social and professional contexts.
- To provide practical exposure through interactive language activities.

UNIT I GRAMMAR

9

Articles - Prepositions - Conditionals - Subject verb agreement- Error Spotting - Active and Passive voice.

UNIT II LISTENING & READING

9

Syllabification –Improving Vocabulary - Reading Newspapers - Listening to Youtube Documentaries- Listening to Podcast- Listening to Motivational Movies.

UNIT III WRITING

9

Checklist - Recommendations - Formal letters – inviting quests – acceptance/declining letters

UNIT IV BUSINESS WRITING

9

E-mail writing - fixing an appointment, cancelling appointment, paper submission for seminars and conferences - Job Application Letter andRésumé.

UNIT V SPEAKING

9

Collaborative task - Turn taking (initiating and responding appropriately) - Negotiating - Exchanging - Suggesting - Comparing and Contrasting - Situational Role-play.

TOTAL: 45 PERIODS





LIST OF EXERCISES

1. Stage Dynamics (Body Language and Paralanguage - Presentation)
2. Day today real time speaking exposures – Story narration, simple, general topics and incidents.
3. Group Discussion
4. Power Point Presentation (Corporate Skills & Public Speaking)
5. Loud Reading
6. Picture Description
7. Interview Skills (Mock Interview & Interview Etiquette)
8. Case Study Report

TOTAL: 15 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Use correct grammar in speech and writing.
- Understand and interpret information from various audio and reading sources.
- Write clear, structured, and formal documents.
- Prepare professional emails, résumés, and job-related letters.
- Communicate effectively in group discussions and presentations.
- Apply communication skills confidently in real-time situations.

TEXT BOOKS

1. S. Sumant, "Technical English II", MavenLearning Private Limited, 2012.
2. Joshi, Manmohan, "Soft Skills", First Edition, Bookboon, 2017.

REFERENCES

1. Dr K Elango, Dr. Veena Selvam, Dr. Sujatha Priyadarshini, "Resonance English for Engineers and Technologists", Cambridge University Press, First Edition, 2013.
2. Seely, John. "Oxford Guide to Effective Writing and Speaking", Oxford University Press.UK,2013.

E-RESOURCES

1. <https://www.fluentu.com/Blog/english/english-small-talk>
2. <https://www.britishcouncil.com>

EXTENSIVE READING

1. Stephen R. Covey, " The 7 Habits of Highly Effective People", Simon & Schuster, 2019.





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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	1	-	-	-	1	-	-	2	3	-	2	-	-
2	1	2	-	2	-	-	-	-	3	-	1	-	-
3	1	-	-	-	-	-	1	-	3	2	2	-	-
4	-	-	-	-	1	-	2	-	3	2	2	-	-
5	-	-	-	-	-	-	1	3	3	2	1	-	-
6	-	-	-	-	-	2	2	2	3	-	2	-	-
AVG.	1	2	-	2	1	2	1.5	2.3	3	2	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation


Chairman - BoS





23PHL201

ENGINEERING PHYSICS LABORATORY

L T P C

(Common to Civil, Mechanical, R & A and Pharm.Tech)

0 0 2 1

OBJECTIVES

- To determine the optical, mechanical, acoustic, thermal, and electrical properties of materials through laser, interferometric, bending, and thermal methods.

LIST OF EXPERIMENTS

(Any Eight experiments to be conducted)

- Determination of wavelength of laser.
- Determination of particle Size lycopodium powder using laser.
- Determination of wavelength of mercury spectrum- Spectrometer.
- Determination of Young's modulus - Uniform bending.
- Torsional Pendulum: Determination of moment of inertia and rigidity modulus.
- Determination of velocity of ultrasonic in liquid.
- Determination of Viscosity of a liquid –Poiseuille's Method.
- Determination of thermal conductivity of bad conductor using Lee's Disc Apparatus.
- Determination of Specific resistance of a given wire using Carey's Foster's Bridge (Virtual).
- Radiation with Temperature Change Using Stefan's Law. (Virtual)

TOTAL: 15 PERIODS

OUTCOMES

Upon completion of this course, the students will be able to:

- Evaluate fundamental properties of materials—such as wavelength, particle size, elastic constants, ultrasonic velocity, viscosity, thermal conductivity and electrical resistance.

TEXT BOOKS

- Indu Prakash and Ramakrishna, "A Text Book of Practical Physics", Sultan Chand & Sons, (2006).

REFERENCES

- R.K. Shukla and Anchal Srivastava, "Practical Physics", New Age International Publishers, (2011).

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	1	1	-	-	-	-	-	-	-	-	-

1-Low 2-Medium 3-High '-' – No Correlation

[Signature]
Chairman - BoS





23CYL101

ENGINEERING CHEMISTRY LABORATORY
(Common to Civil, EEE, ECE, Mech, MDE, R&A and PT)

L T P C

0 0 2 1

OBJECTIVE

- To inculcate practical skills in the determination of water quality parameters and instrumental analysis.

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

- Determination of total, temporary & permanent hardness of water by EDTA method.
- Determination of alkalinity in water sample.
- Determination of DO content of water sample by Winkler's method.
- Determination of chloride content of water sample by Argentometric method.
- Determination of strength of given hydrochloric acid using pH meter.
- Estimation of sodium and potassium present in water using flame photometer.
- Conductometric Precipitation Titration using BaCl_2 and Na_2SO_4 .
- Conductometric titration of strong acid vs strong base.
- Estimation of Ferrous ions by Potentiometric Titration.
- Estimation of copper content in the brass by Iodometry.

OUTCOMES

Upon completion of the course, the students will be able to:

- Determine the water quality parameters and perform quantitative chemical analysis by pH metery, flame photometry, conductometry and potentiometry.

TOTAL: 15 PERIODS

TEXT BOOKS

- J. Mendham, R. C. Denney, J. D. Barnes, and M. J. K. Thomas, Vogel's Textbook of Quantitative Chemical Analysis, 6th ed. Pearson Education, 2015.

REFERENCES

- B. K. Sharma, Instrumental Methods of Chemical Analysis, Goel Publishing House, 2005.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	1	1	2	1	1	2	-	-	-	-

1-Low 2-Medium 3-High '-' – No Correlation

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23EEC201

INDIAN LANGUAGE
(EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE
(Common to all B.E. & B.Tech. Branches)

L T PC
0 0 4 2

OBJECTIVES

- To learn the Hindi alphabet, pronunciation, and basic writing.
- To understand and use basic Hindi grammar correctly.
- To develop basic reading, writing, listening, and speaking skills in Hindi.
- To use Hindi for simple everyday communication.
- To prepare learners to successfully clear the Hindi Examination.

UNIT I वर्णमाला एवं मूलभूत व्याकरण (ALPHABET AND BASIC GRAMMAR)

5

Hindi Vowels (स्वर)- Hindi Consonants (व्यंजन) -Matras (मात्राएँ)- Barakhadi (बारहखड़ी)-Word Formation (शब्दनिर्माण)- Gender (लिंग)- Number (वचन)- Basic Sentence -Formation (सरलवाक्यरचना)

UNIT II शब्दभंडार एवं व्याकरण (VOCABULARY AND GRAMMAR)

7

Nouns (संज्ञा)- Pronouns (सर्वनाम) -Adjectives (विशेषण) -Verbs (क्रिया) -Tenses (काल- Present, Past, Future) - Opposite Words (विलोमशब्द) -Synonyms (पर्यायवाची) -One-word Substitutions (अनेकशब्दोंकेलिएएकशब्द)

UNIT III पठन एवं लेखन कौशल (READING AND WRITING SKILLS)

7

Reading Simple Hindi Passages -Comprehension (गद्यांश) -Paragraph Writing (अनुच्छेदलेखन)- Letter Writing (पत्रलेखन)- Dialogue Writing (संवादलेखन) -Picture Description (चित्रवर्णन) -Dictation Practice (श्रुतिलेख)

UNIT IV दैनिक जीवन में हिंदी (HINDI FOR EVERYDAY COMMUNICATION)

7

Greetings and Introductions -Family Members (परिवार)- Days, Months, Seasons -Numbers (१-१००) -Time and Date - Colours, Fruits, Vegetables - Shopping Conversations - School and Classroom Vocabulary -Common Everyday Conversations

UNIT V साहित्य एवं पुनरावृत्ति (LITERATURE AND REVISION)

4

Simple Poems (कविताएँ)- Short Stories (लघुकथाएँ)- Proverbs and Idioms (मुहावरे एवं लोकोक्तियाँ)- basic) -Moral Stories - Translation (English/Tamil to Hindi - Simple Sentences) - Revision of Grammar - Model Question Papers and Practice Tests

TOTAL: 30 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

1. Write basic Hindi words and sentences.
2. Apply fundamental Hindi grammar in simple communication.
3. Develop basic reading, writing, listening, and speaking skills in Hindi.
4. Use Hindi confidently in day-to-day conversations.
5. Develop proficiency required to successfully clear the Hindi Examination.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	-	-	-	-	-	-	-	-	3	-	1	-	-
2	-	-	-	-	-	-	1	1	3	-	1	-	-
3	-	-	-	-	-	-	1	2	3	-	2	-	-
4	-	-	-	-	-	1	2	2	3	-	1	-	-
5	-	-	-	-	-	-	-	-	2	-	3	-	-
AVG.	-	-	-	-	-	1.0	1.3	1.6	2.8	-	1.6	-	-

1- Low 2-Medium 3-High '-' – No Correlation

P. Ganga
Chairman - BoS





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23EEEC201

TIRUCHENGODE- 637 205

INDIAN LANGUAGE
(EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE

(Common to all B.E. & B.Tech. Branches)

L T PC
0 0 4 2

OBJECTIVES

- To learn the German alphabet, pronunciation, and basic communication.
- To understand and use basic German grammar and vocabulary.
- To communicate in German in simple everyday situations.
- To develop basic reading, writing, listening, and speaking skills in German.
- To apply basic German language skills confidently through practice and revision.

UNIT I INTRODUCTION TO GERMAN LANGUAGE

6

German alphabet and pronunciation –Greetings –Self-introduction (Name, age, nationality, profession) - Numbers (0–100) -Days, months, seasons, and dates - Basic classroom expressions - Personal pronouns -Verb **sein** (to be) -Simple sentence formation

UNIT II BASIC GRAMMAR AND VOCABULARY

7

Definite and indefinite articles (der, die, das; ein, eine) - Nouns and gender - Singular and plural forms - Verb conjugation (regular verbs) - Present tense - Question words (Wer, Was, Wo, Wann, Wie, Warum) - Negation (nicht, kein) - Vocabulary: Family, occupations, countries, languages, colors

UNIT III EVERYDAY COMMUNICATION

7

Daily routine - Time and clock reading - Food and beverages - Shopping conversations - Asking for and giving directions -Making simple requests -Modal verbs (möchten, können) - Vocabulary: Home, school, transportation, weather

UNIT IV READING, WRITING, LISTENING, AND SPEAKING SKILLS

5

Reading short dialogues - Listening to simple conversations - Writing short paragraphs- Describing people, places, and objects - Introducing family and friends

UNIT V PRACTICAL APPLICATIONS AND REVISION

5

Travel and tourism vocabulary - At the restaurant - At the railway station and airport -Revision of grammar topics - Translation of simple sentences (English to German and German to English)

TOTAL: 30 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Identify the German alphabet and pronounce basic German words correctly.
- Use basic German vocabulary and simple grammar in sentences.
- Practice in simple German for everyday situations.
- Understand basic German texts and conversations.
- Apply basic German language skills confidently in simple real-life situations.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO11	PSO1	PSO2
1	-	-	-	-	-	-	-	-	3	-	1	-	-
2	-	-	-	-	-	-	1	1	3	-	1	-	-
3	-	-	-	-	-	1	2	2	3	-	2	-	-
4	-	-	-	-	-	-	1	2	3	-	2	-	-
5	-	-	-	-	-	1	2	2	3	-	2	-	-
AVG.	-	-	-	-	-	1	1.5	1.75	3.0	-	1.6	-	-

1- Low 2-Medium 3-High '-' – No Correlation

P. Sangeetha
Chairman - BoS





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INDIAN LANGUAGE

(EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE

(Common to all B.E. & B.Tech. Branches)

L T P C

0 0 4 2

OBJECTIVES

- To learn the Japanese writing system, pronunciation, and basic vocabulary.
- To understand and use basic Japanese grammar and sentence patterns.
- To communicate in Japanese in simple everyday situations.
- To develop basic reading, writing, listening, and speaking skills in Japanese.
- To apply basic Japanese language skills confidently through practice and real-life communication.

UNIT I WRITING SYSTEMS & PRONUNCIATION

5

Hiragana chart reading and writing - Katakana chart reading and writing - Basic pronunciation rules (long vowels, double consonants) - Numbers - Colours, body parts, pets description

UNIT II KANJI & BASIC GRAMMAR

7

First 50 Kanji (Numbers, Time & Days, Basic Directions & People) - Topic marker は (wa) - Identification sentences: Noun + です (desu) - Possession particle の (no) - Inclusion particle も (mo) - Subject marker が (ga) - Direction particles へ (he) and に (ni) - Self-introductions and greetings (Aisatsu) - Numbers, prices, shopping terms - Days, months, relative time - Family members and occupations

UNIT III KANJI & FUNCTIONAL GRAMMAR

8

Next 50 Kanji (Nature, Core Verbs, Adjectives & Nouns) - Verb groups (Group 1, Group 2, Group 3) - Masu forms (Present, Past, Positive & Negative) - Te-form (~て): requests, connecting sentences, continuous actions (~ている) - Adjective conjugation (い & な adjectives) - Desires (~たい) and Invitations (~ましょう)

UNIT IV VOCABULARY & FUNCTIONAL COMMUNICATION

5

Action verbs (daily routine, hobbies) - Adjectives for people, food, and places - Positional words (inside, outside, next to, between) - Transport, travel, and location vocabulary - Simple conversations in everyday situations

UNIT V READING & LISTENING COMPREHENSION

5

Reading short sentences in Hiragana, Katakana, and basic Kanji - Understanding classroom instructions - Listening to slow, clear daily-life conversations - Understanding simple shopping dialogues

TOTAL: 30 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Identify the Japanese writing system and pronounce basic Japanese words correctly.
- Use basic Japanese vocabulary and simple grammar in sentences.
- Communicate in simple Japanese for everyday situations.
- Read, write, listen to, and understand basic Japanese texts and conversations.
- Apply basic Japanese language skills confidently in simple real-life situations.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	-	-	-	-	1	1	-	1	2	-	-	-	-
2	-	-	-	-	1	2	-	2	2	-	-	-	-
3	-	-	-	-	2	2	1	2	3	-	1	-	-
4	-	-	-	-	2	2	1	3	3	-	1	-	-
5	-	-	-	-	1	1	1	2	3	-	1	-	-
AVG.	-	-	-	-	1.4	1.6	1.0	0.2	2.6	-	1.0	-	-

1- Low 2-Medium 3-High '-' – No Correlation

P. Chandy
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23MDC201

APTITUDE SKILLS

(Common to all Branches)



L T P C

3 0 0 0

OBJECTIVES

- To introduce the basics concepts and techniques of numbers, Highest common factor and Least common multiple.
- To develop the use of decimal fraction and problems on ages.
- To introduce the basic concepts of time, work, distance, calendar and clock.
- To explain the student with the concept of simple and compound interest.
- To provide the knowledge of polynomial and quadratic equations.

UNIT I NUMBERS, HIGHEST COMMON FACTOR AND LEAST COMMON MULTIPLE 9

Numbers and their basic classification – Types of number – Basic operations of numbers – Progression – Tests of divisibility – Highest common factor – Least common multiple

UNIT II DECIMAL FRACTION AND PROBLEMS BASED ON AGES 9

Decimal fraction – Types of fraction – Comparison of fractions – Inserting fractions in between two given fractions – Relation between decimal fraction and normal fraction – Conversion of a decimal fraction into a vulgar fraction – Types of decimals – Conversion of mixed recurring decimal into a vulgar fraction – Standard form of decimal – Problems based on ages.

UNIT III TIME, WORK, DISTANCE, CALENDER AND CLOCK 9

General rule for time and work – General rule for work and wages – Speed – Unit of speed – Average speed – Some useful relations – Problems on Trains – Calendars and clocks – Odd days – Ordinary year – Leap year.

UNIT IV SIMPLE INTEREST, COMPOUND INTEREST AND ELEMENTARY ALGEBRA 9

Simple interest – Compound interest – Some useful relations – Difference between compound interest and simple interest – Short cut methods to solve special types of problems – Elementary Algebra and averages.

UNIT V POLYNOMIAL AND QUADRATIC EQUATIONS 9

Polynomial introduction – Degree of a polynomial – Types of polynomial – Operations on polynomial – Remainder and factor theorem – Quadratic equation – Pure Quadratic equation – Discriminant – Roots of the Quadratic equations – Solution of Quadratic equation – Framing of a Quadratic equation – Special types of roots.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Apply basic concepts and techniques highest common factor and least common multiple on numbers.
- Apply the concept of decimal fraction and problems on ages.
- Apply the concept of time, work, distance, calendar and clock.
- Develop proficiency in simple interest, compound interest and basic algebraic skills.
- Explain the concepts and properties of polynomial and quadratic equations.

TEXT BOOKS

1. Agarwal R.S., "Quantitative Aptitude", S. Chand & Company Ltd, New Delhi, 2012.
2. Dinesh Khattar, "Quantitative Aptitude for competitive examinations ", Pearson India Education Services Pvt. Ltd., New Delhi, 2019.

REFERENCES

1. Praveen R.V., "Quantitative Aptitude and Reasoning", PHI Learning Private Limited, Delhi, 2013.
2. Gupta P, "A unique Approach to Quantitative Aptitude ", Unique Publishers (I) Pvt. Ltd, New Delhi, 2017.

E-RESOURCES

1. <https://youtube.com/playlist?list=RDQM5XI256aOq24>
2. <https://youtu.be/KE7tQi9spPg>


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SEMESTER III

23MAT304	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	L T P C
	[Common to Civil, Mech, R&A and PT]	3 1 0 4

OBJECTIVES

- To introduce the basics of Fourier transforms and their properties.
- To compute the Z-transforms of standard functions and their properties.
- To provide knowledge of Fourier series and half-range series.
- To explore the basic concepts of partial differential equation.
- To explain the classification and applications of partial differential equations.

UNIT I FOURIER TRANSFORMS

9+3

Statement of Fourier integral theorem – Fourier transform – Fourier sine and cosine transforms – Properties of Fourier transform – Convolution theorem for Fourier transform – Parseval's identity for Fourier transform.

UNIT II Z-TRANSFORMS AND DIFFERENCE EQUATIONS

9+3

Z-transforms: Some standard Z-transforms – Elementary properties – Some useful Z-transforms and inverse Z-transforms – Convolution theorem – Evaluation of Inverse Z-transforms by partial fraction method – Application to difference equations.

UNIT III FOURIER SERIES

9+3

Euler's formulae – Conditions for a Fourier expansion – Functions having points of discontinuity – Odd and even function – Half range series – Parseval's formula – Practical Harmonic analysis.

UNIT IV PARTIAL DIFFERENTIAL EQUATIONS

9+3

Formation of partial differential equations – Singular integrals – Solutions of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients of homogeneous types.

UNIT V APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

9+3

Classification of partial differential equations – Method of separation of variables – Fourier series solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

TOTAL:45+15 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Apply various Fourier transform techniques in physical problems of engineering.
- Solve engineering problems using the concept of Z transforms.
- Analyze Fourier series for periodic functions and functions with discrete data.
- Apply the standard types of partial differential equations.
- Evaluate the Fourier series techniques in application of partial differential equations.

TEXT BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, Fourty Fourth Edition, 2022.
2. Narayanan S., Manicavachagom Pillay.T.K and Ramanaiah.G., "Advanced Mathematics for Engineering Students", S.Viswanathan Publishers, Fourth Edition,1998.

REFERENCES

1. N.P. Bali. and Manish Goyal, "A Textbook of Engineering Mathematics", Laxmi Publications Pvt. Ltd, Nineth Edition, 2014.
2. Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, Tenth Edition,2016.

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/111/102/111102129/#> (Transforms)
2. <https://archive.nptel.ac.in/courses/111/103/111103021/> (Partial differential equations)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	2	2	-	-	-	-	-	2	-	-
2	3	3	2	2	2	-	-	-	-	-	2	-	-
3	3	3	2	2	2	-	-	-	-	-	2	-	-
4	3	3	2	2	2	-	-	-	-	-	2	-	-
5	3	3	2	2	2	-	-	-	-	-	2	-	-
AVG.	3	3	2	2	2	-	-	-	-	-	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation


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TIRUCHENGODE- 637 205

23CET301

CONSTRUCTION MATERIALS AND PRACTICES

L T P C

3 0 0 3

OBJECTIVES

- To inculcate the basic of bricks, cement and concrete blocks.
- To explore the characteristics of lime, cement, aggregates and mortar.
- To enhance the fundamentals of timber and building component.
- To instruct the basic concepts of modern materials.
- To familiarize with the importance of good concrete construction.

UNIT I STONES, BRICKS AND CONCRETE BLOCKS

9

Stone as Building Material – Criteria for Selection – Tests on Stones – Deterioration and Preservation of Stone Work – Bricks – Classification – Manufacturing of Clay and Fly Ash Bricks – Tests on Bricks– Compressive Strength – Water Absorption – Efflorescence – Bricks for Special Use – Refractory Bricks – Cement, Concrete Blocks – Light weight Concrete Blocks.

UNIT II LIME, CEMENT, AGGREGATES AND MORTAR

9

Lime: Characteristics, Classification, Manufacturing Process – Cement: Ingredients, Types and Grades, Properties, Manufacturing process, Testing of Cement – Industrial By – products: Fly ash – Aggregates: Natural Stone Aggregates, Classification Characteristics of Aggregates, Testing of Aggregates – Cement Mortar: Functions, Uses of Mortar, Types of Mortar, Ingredients of Mortar, Tests.

UNIT III TIMBER AND OTHER MATERIALS

9

Timber – Market Forms – Industrial Timber– Plywood – Veneer – Thermacole – Panels Laminates–Steel – Aluminum and Other Metallic Materials – Composition–Aluminium composite panel–Uses– Market forms – Mechanical treatment – Paints – Varnishes – Distempers – UPVC in doors, windows, MDF materials – Paneling materials and false ceiling techniques.

UNIT IV MODERN MATERIALS

9

Glass – Ceramics – Sealants for Joints – Fibre Glass Reinforced Plastic – Clay Products – Refractories – Composite Materials – Types – Applications of Laminar Composites – Fibre Textiles – Geo – membranes and Geo – textiles for Earth Reinforcement – Recycled Aggregates.

UNIT V CONSTRUCTION PRACTICES

9

Specifications ,Details and Sequence of activities and Construction Co-ordination– Site Clearance – Marking – Earthwork – Masonry – Stone masonry – Bond in Masonry – Concrete Hollow Block Masonry – Flooring – Damp Proof Courses – Construction Joints – Movement and Expansion Joints – Precast Pavements – Building Foundations – Basements Temporary Shed – Centering and Shuttering – Slip forms – Scaffoldings –De-shuttering Forms – Laying Brick – Weather and Waterproof – Roof Finishes – Acoustic and Fire Protection.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Identify the suitable construction materials for building construction.
- Apply the knowledge on lime, cement, aggregates and mortar.
- Construct the basic properties of timber and other materials
- Analyze the appropriate advanced and modern building materials for various construction applications.
- Examine the site clearance and bond in masonry

TEXT BOOKS

1. R.K.Gupta, "Civil Engineering Materials and Practices", Jain Brothers, Fifth Edition, 2019.
2. Varghese P.C, "Building Materials", Prentice Hall India, Second Edition, 2020.
3. Rajput R.K, "Engineering Materials", S Chand and Company, Third Edition, 2019.

REFERENCES

1. Taylor G.D, "Materials in Construction: An Introduction", Longman Inc, Third Edition, 2020.
2. Gambhir M.L and Neha Jamwal, "Building Materials, products, properties and systems", Tata McGraw Hill Educations Pvt. Ltd, First Edition, 2020.
3. S.K Kharm, "Building Construction", S.Chand Publishers, Second Edition, 2021.

E-RESOURCES

1. [https://nptel.ac.in/courses/105/102/105102088/\(Building Materials and Construction\)](https://nptel.ac.in/courses/105/102/105102088/(Building%20Materials%20and%20Construction))
2. [https://nptel.ac.in/noc/courses/noc21/SEM1/noc21-ce10/ \(Basic construction materials\)](https://nptel.ac.in/noc/courses/noc21/SEM1/noc21-ce10/(Basic%20construction%20materials))

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	-	-	-	-	2	-	1	1	1	3	3	-
2	3	-	-	-	-	2	-	1	1	1	3	3	-
3	3	-	-	-	-	2	-	1	1	1	3	3	-
4	3	-	-	-	-	2	-	1	1	1	3	3	-
5	3	-	-	-	-	2	-	1	1	1	3	3	-
AVG.	3	-	-	-	-	2	-	1	1	1	3	3	-

1-Low 2-Medium 3-High '-' – No Correlation

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TIRUCHENGODE- 637 205



23CET302

APPLIED GEOLOGY

L T P C

3 0 0 3

OBJECTIVES

- To inculcate the branches of geology and its importance to civil engineering.
- To acquire the physical properties and formation of minerals.
- To impart knowledge on the classification of rocks and engineering properties of rocks.
- To enhance the geological maps, study of structures, folds, faults, joints and geophysical methods.
- To familiarize the geological investigation for dams, tunnels etc.

UNIT I PHYSICAL GEOLOGY

9

Geology in Civil Engineering – Branches of Geology – Structure of Earth and its composition
Weathering of rocks – Scale of weathering – Soils - Landforms and processes associated with
River, Wind, Groundwater and Sea – Relevance to Civil Engineering. Plate tectonics – Earth
quakes – Seismic zones in India.

UNIT II MINERALOGY

9

Physical properties of minerals – Quartz group, Feldspar group, Pyroxene - Hypersthene and
Augite, Amphibole – Hornblende, Mica – Muscovite and Biotite, Calcite, Gypsum and Clay
minerals.

UNIT III PETROLOGY

9

Classification of rocks, Distinction between Igneous, Sedimentary and Metamorphic rocks.
Engineering properties of rocks. Description, Occurrence, Engineering properties, Distribution
and Uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble,
Slate, Gneiss and Schist.

UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS

9

Geological Maps – Attitude of Beds, Study of Structures – Folds, Faults and Joints – Their
Bearing on Engineering Construction. Geophysical methods – Seismic and Electrical methods
for Subsurface Investigations.

UNIT V APPLICATION OF GEOLOGICAL INVESTIGATIONS

9

Remote Sensing for Civil Engineering applications; Geological conditions necessary for
designing and construction of Dams, Reservoirs, Tunnels and Road cuttings - Hydrogeological
investigations and Mining - Coastal protection structures. Investigation of Landslides, Causes
and mitigation.

TOTAL : 45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Apply geological principles related to the Earth's structure, composition and branches of geology in civil engineering projects.
- Examine the physical properties of minerals.
- Identify the types of rocks, their distribution and uses.
- Analyze the methods of study on geological structure and subsurface investigations.
- Examine the application of geological investigation in projects such as dams, reservoirs, tunnels and road cuttings.

TEXT BOOKS

1. Chenna Kesavulu N, "Textbook of Engineering Geology", Macmillan Publishers India Limited, Third Edition, 2019.
2. Parbin Singh A, "Engineering and General Geology", S.K.Kataria and Sons, Ninth Edition, 2019.
3. Varghese P.C, "Engineering Geology for Civil Engineers", Prentice Hall of India Learning Private Limited, Third Edition, 2020.

REFERENCES

1. S.K.Duggal, " Engineering Geology", McGraw Hill Book company, Forth Edition, 2019.
2. Blyth F.G.H and de Freitas M.H, "Geology for Engineers", Edward Arnold, Fifth Edition, 2020.
3. Krynine and Judd, "Engineering Geology and Geotechniques", McGraw Hill Book Company, Eighth Edition, 2019.

E-RESOURCES

1. [https://nptel.ac.in/courses/105/105/105105106/\(Introduction to Engineering Geology\)](https://nptel.ac.in/courses/105/105/105105106/(Introduction%20to%20Engineering%20Geology))
2. [https://archive.nptel.ac.in/courses/105/105/105105106/\(Geologic Structures\)](https://archive.nptel.ac.in/courses/105/105/105105106/(Geologic%20Structures))

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	-	-	-	-	1	-	-	2	1	2	2	-
2	3	-	-	-	-	1	-	-	2	1	2	2	-
3	3	-	-	-	-	1	-	-	2	1	2	2	-
4	3	-	-	-	-	1	-	-	2	1	2	2	-
5	3	-	-	-	-	1	-	-	2	1	2	2	-
AVG.	3	-	-	-	-	1	-	-	2	1	2	2	-

1-Low 2-Medium 3-High '-' – No Correlation

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23CET303

SOIL MECHANICS

L T P C

3 0 0 3

OBJECTIVES

- To impart knowledge on the basic properties and classification of soil.
- To inculcate the effective stress concepts of soil.
- To familiarize the vertical stress distribution and settlement in soil.
- To explore the behaviour of soil under shear.
- To acquire the stability of slopes.

UNIT I SOIL CLASSIFICATION AND COMPACTION

9

Nature of Soil – Problems with Soil – Phase Relation – Sieve Analysis – Sedimentation Analysis – Atterberg Limits – Classification for Engineering Purposes – BIS Classification System – Soil Compaction – Factors Affecting Compaction – Laboratory Compaction Methods.

UNIT II SOIL WATER AND PERMEABILITY

9

Soil Water – Various Forms – Influence of Clay Minerals – Capillary Rise – Suction – Effective Stress – Concepts in Soil – Total, Neutral and Effective Stress Distribution in Soil – Permeability – Darcy's Law – Permeability Measurement in the Laboratory – Quick Sand Condition – Seepage – Introduction to Flow Nets – Properties and Uses – Application to Simple Problems.

UNIT III STRESS DISTRIBUTION, COMPRESSIBILITY AND SETTLEMENT

9

Stress Distribution – Soil Media – Boussinesq Theory – Use of Newmark's Influence Chart – Components of Settlement – Immediate and Consolidation Settlement – Terzaghi's One Dimensional Consolidation Theory – Computation of Rate of Settlement. – $\sqrt{t}$ and $\log t$ Methods – e - $\log p$ Relationship – Factors Influencing Compression Behaviour of soils.

UNIT IV SHEAR STRENGTH

9

Shear strength of Cohesive and Cohesion less Soils – Mohr – Coulomb Failure Theory – Saturated Soil – Strength Parameters – Measurement of Shear Strength, Direct Shear, Tri-axial Compression, UCC and Vane Shear Tests – Types of Shear Tests Based on Drainage and their Applicability – Drained and Un-drained Behavior of Clay and Sand.

UNIT V SLOPE STABILITY

9

Slope Failure Mechanisms – Modes – Infinite Slopes – Finite Slopes – Total and Effective Stress Analysis – Stability Analysis for Purely Cohesive and $C - \phi$ Soil – Method of Slices – Modified Bishop's Method – Friction Circle Method – Stability Number – Problems – Slope Protection Measures.

TOTAL: 45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Classify the soil and assess the engineering properties, based on index properties.
- Identify the stress concepts in soils.
- Examine the settlement in soils.
- Develop the shear strength of soil.
- Analyze the both finite and infinite slopes.

TEXTBOOKS

1. K. R. Arora, "Soil Mechanics and Foundations", Standard Publishers, Seventh Edition, 2019
2. Gopal Ranjan and Rao A.S.R, "Basic and applied Soil Mechanics", New Age International, Third Edition, 2019.
3. Punmia B.C, Ashok Kumar Jain, Arun Kumar Jain, "Soil Mechanics and Foundations", Laxmi Publications, Sixteenth Edition, 2021.

REFERENCES

1. McCarthy D.F, "Essentials of Soil Mechanics and Foundations: Basic Geotechnics", Prentice Hall of India, Fourth Edition, 2019.
2. Muni Budhu, "Soil Mechanics and Foundations", John Willey & Sons Inc, Third Edition 2022.
3. Venkatramaiah C, "Geotechnical Engineering", New Age International, Sixth Edition, 2021.

E-RESOURCES

1. [https://nptel.ac.in/courses/105/101/105101084/\(Soil Mechanics\)](https://nptel.ac.in/courses/105/101/105101084/(Soil%20Mechanics))
2. <http://www.nptelvideos.in/2012/11/soil-mechanics.html> (Soil Mechanics)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	-	2	-	1	-	-	-	-	3	3	-
2	3	2	-	2	-	1	-	-	-	-	3	3	-
3	3	2	-	2	-	1	-	-	-	-	3	3	-
4	3	2	-	2	-	1	-	-	-	-	3	3	-
5	3	2	-	2	-	1	-	-	-	-	3	3	-
AVG.	3	2	-	2	-	1	-	-	-	-	3	3	-

1-Low 2-Medium 3-High '-' – No Correlation

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23CEE301

SURVEYING AND LEVELLING
(Lab Embedded Theory Course)

L T P C
3 0 2 4

OBJECTIVES

- To explore the principles and concepts of chain and compass surveying.
- To acquire the concept of levelling and contours in field measurement.
- To enhance the elevation of objects by using theodolite survey.
- To develop the concept of tacheometric and triangulation survey.
- To impart the measurements with modern digital instruments.
- To gain knowledge the survey field exercises for land measurement.

UNIT I CHAIN AND COMPASS SURVEYING

9

Definition – Principles – Classification – Plan and map – Scales – Ranging and chaining – Corrections – Types of Compass – Bearing – Types – True and magnetic bearing – Systems and conversions – Dip and declination – Local attraction – Adjustment of errors.

UNIT II LEVELLING AND CONTOURING

9

Level line – Horizontal line – Spirit level – Mean sea level – Sensitiveness – Bench marks – Levelling instruments – Types of Levelling – Booking and reduction of levels – Curvature and refraction – Calculation of areas and volumes – Contouring – Characteristics and uses.

UNIT III THEODOLITE SURVEY AND CURVE SETTING

9

Theodolite survey – Omitted measurements – Curves – types – components and elements of simple curve – Setting out a simple curve by Rankine's method and two theodolite method – Transition curves – Functions and requirements.

UNIT IV TACHEOMETRIC AND TRIANGULATION SURVEY

9

Tacheometric systems – Tangential and stadia methods – Stadia systems – Determination of stadia constants – Anallactic Lens – Triangulation – Corrections – Satellite station – Reduction to centre – Trigonometric Levelling – Single and reciprocal observations.

UNIT V DIGITAL SURVEY

9

Introduction, Aerial Photogrammetry, Terrestrial Photogrammetry, Stereoscopy, Types of EDM Instruments - Total station – Principles of Remote Sensing and its Applications - Basics of GIS & GPS.

LIST OF EXPERIMENTS

1. Chain Surveying: Determination of given area using chain and cross staff survey.
2. Compass Surveying: Determination of bearings and calculation of included angles using compass.
3. Levelling: Determination of elevation of given points by fly leveling.
4. Levelling: Determination of height difference between the points by conducting differential and reciprocal levelling.
5. Theodolite Surveying: Determination of elevation between two points condition by base is accessible and Inaccessible
6. Tachometric Surveying :Determination of Stadia Constant





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7. Tachometric Surveying: Determination of distance and elevation by stadia method
8. Tachometric Surveying: Determination of distance and elevation by tangential method.
9. Total Station: Measurement of distance, elevation and area.
10. Total Station: Setting out works – foundation, column marking

TOTAL: 45+15=60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Apply the chain and compass surveying.
- Analyze the levels and to calculate the area and volume.
- Construct the adjustments of closed traverse for errors and setting out the simple curves.
- Examine the tachometric and triangulation surveying.
- Identify the principles, concepts and applications of digital surveying
- Construct the practical knowledge on handling basic survey instruments including theodolite, tachemetry and total station.

TEXT BOOKS

1. Punmia B.C, "Surveying, Vol. I and II", Laxmi Publications, Seventeenth Edition, 2019.
2. Basak N.N, "Surveying and Levelling", Tata McGraw Hill Publishing Company Ltd., Second Edition 2019.
3. Kanetkarand T P, Kulkarni S.V, "Surveying and Levelling", Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Fifth Edition, 2020.

REFERENCES

1. Kanetkar T. P, "Surveying and Levelling Vols. I &II", United Book Corporation, Third Edition, 2020.
2. Roy S K, "Fundamentals of Surveying", Prentice Hall of India, Fifth Edition, 2019.
3. Subramanian R, "Surveying and Levelling", Oxford University Press, Second Edition 2021.

E-RESOURCES

1. [https://nptel.ac.in/courses/105/107/105107122/\(Surveying\)](https://nptel.ac.in/courses/105/107/105107122/(Surveying))
2. [https://nptel.ac.in/courses/105/104/105104101/\(Surveying\)](https://nptel.ac.in/courses/105/104/105104101/(Surveying))

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	3	-	1	-	-	1	1	3	3	1
2	3	3	3	3	-	1	-	-	1	1	3	3	1
3	3	3	3	3	-	1	-	-	1	1	3	3	1
4	3	3	3	3	-	1	-	-	1	1	3	3	1
5	3	3	3	3	-	1	-	-	1	1	3	3	1
6	3	3	3	3	-	1	-	-	1	1	3	3	1
AVG.	3	3	3	3	-	1	-	-	1	1	3	3	1

1-Low 2-Medium 3-High '-' – No Correlation

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23CEE302

MECHANICS OF MATERIALS

L T P C

(Lab Embedded Theory Course)

3 0 2 4

OBJECTIVES

- To instruct the fundamental concepts of Stress, Strain and deformation of solids.
- To impart knowledge the shear force and bending moment.
- To enhance the bending stress and shear stress distribution in various sections.
- To explore the deflection of beams under the application of external forces.
- To gain knowledge on the performance of columns.
- To acquire practical skills on the behavior of various materials under tension , compression, shear and torsion.

UNIT I STRESS, STRAIN AND DEFORMATION

9

Introduction – Stress, Strain – Types – Elastic limit – Hooke's law – Stress Strain curves – Elastic constants and its relationships–Deformation of simple and compound bars– Principles of Superposition – Varying cross section – Thermal stress in composite bars – Principal stresses and principal planes.

UNIT II SHEAR FORCE AND BENDING MOMENT

9

Types of beams – Types of loads, supports and reactions–Bending moment and Shear force – Sign conventions – Point of contraflexure–Shear force and bending moment diagrams for concentrated load, uniformly distributed load and uniformly varying load.

UNIT III STRESSES IN BEAMS AND SHAFTS

9

Types of Bending stresses – Theory of simple bending – Derivation of flexure/bending equation – Bending stress distribution – Position of N.A and centroidal axis – Stiffness equation –Theory of Pure Torsion – Assumptions – Torsion equation– Shear stress distribution in circular section due to torsion.

UNIT IV DEFLECTION OF BEAMS

9

Beam Deflection – Slope - Sign conventions - Double integration method –Macaulay's Method – Moment area method – Mohr's Theorems – Conjugate beam method.

UNIT V THEORY OF COLUMN

9

Column and strut – Classification of columns – Slenderness ratio – Buckling load and factor – Effective length – Various end conditions–Euler's theory, assumptions, formula and limitations – Rankine's formula – Crippling load and Safe load.

LIST OF EXPERIMENTS

1. Tension test on mild steel / deformed steel bars.
2. Deflection test on Simply Supported Beams of (a) wood and (b) steel.
3. Impact Test on mild steel by performing Izod/Charpy tests.
4. Torsion test on mild steel bar to determine the Modulus of Rigidity.
5. Double Shear test on metal.





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6. Hardness test on metals (Rockwell and Brinell Hardness Tests).
7. Compression test on helical spring.
8. Deflection test on carriage spring.
9. Fatigue test on steel rod
10. Thermal expansion test on steel rod

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the various types of stresses and strains developed in the member.
- Construct the shear force and bending moment diagram for beams under various loading conditions.
- Examine the bending and shear stresses in beams and shafts.
- Identify the slope and deflection of beams by different methods.
- Classify the failure modes for various types of columns.
- Apply the mechanical properties of steel.

TEXT BOOKS

1. Rajput R.K. "Strength of Materials", S. Chand & Company, Seventh Edition, 2019.
2. Bansal R.K. "Strength of Materials", Laxmi Publications, Sixth Edition, 2020.
3. Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., Third Edition, 2019.

REFERENCES

1. William A .Nash, "Theory and Problems of Strength of Materials", Schaums Outline Series, Tata McGraw Hill Publishing Company Ltd, Eighth Edition, 2020.
2. Egor P Popov, "Engineering Mechanics of Solids", Prentice Hall of India, Fifth Edition, 2019.
3. Subramanian R, "Strength of Materials", Oxford University Press, Second Edition, 2021.

E-RESOURCES

1. [https://nptel.ac.in/courses/112/107/112107146\(Strength of Materials\)](https://nptel.ac.in/courses/112/107/112107146(Strength of Materials))
2. [https://nptel.ac.in/courses/105/105/105105108/\(Introduction to Strength of Materials\)](https://nptel.ac.in/courses/105/105/105105108/(Introduction to Strength of Materials))

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	3	-	3	-	-	2	1	2	3	3
2	3	3	2	3	-	3	-	-	2	1	2	3	3
3	3	3	2	3	-	3	-	-	2	1	2	3	3
4	3	3	2	3	-	3	-	-	2	1	2	3	3
5	3	3	2	3	-	3	-	-	2	1	2	3	3
6	3	3	2	3	-	3	-	-	2	1	2	3	3
AVG.	3	3	2	3	-	3	-	-	2	1	2	3	3

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS





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23EEEC301

PROFESSIONAL DEVELOPMENT

L T P C
0 0 2 1

OBJECTIVES

To be proficient in important Microsoft Office tools: MS WORD, EXCEL and POWERPOINT.

- To be proficient in using MS WORD to create quality technical documents, by using standard templates, widely acceptable styles and formats, variety of features to enhance the presentability and overall utility value of content.
- To be proficient in using MS EXCEL for all data manipulation tasks including the common statistical, logical, mathematical etc., operations, conversion, analytics, search and explore, visualize, interlink, and utilizing many more critical features offered.
- To be able to create and share quality presentations by using the features of MS PowerPoint, including: organization of content, presentability, aesthetics, using media elements and enhance the overall quality of presentations.

MS WORD:

10 Hours

Create and format a document

Working with tables

Working with Bullets and Lists

Working with styles, shapes, smart art, charts

Inserting objects, charts and importing objects from other office tools

Creating and Using document templates

Inserting equations, symbols and special characters

Working with Table of contents and References, citations

Insert and review comments

Create bookmarks, hyperlinks, endnotes footnote

Viewing document in different modes

Working with document protection and security

Inspect document for accessibility





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MS EXCEL:

10 Hours

Create worksheets, insert and format data
Work with different types of data: text, currency, date, numeric etc.
Split, validate, consolidate and Convert data
Sort and filter data
Perform calculations and use functions: (Statistical, Logical, Mathematical, date, Time etc.)
Work with Lookup and reference formulae
Create and Work with different types of charts
Use pivot tables to summarize and analyze data
Perform data analysis using own formulae and functions
Combine data from multiple worksheets using own formulae and built-in functions to generate results
Export data and sheets to other file formats
Working with macros
Protecting data and Securing the workbook

MS POWERPOINT:

10 Hours

Select slide templates, layout and themes
Formatting slide content and using bullets and numbering
Insert and format images, smart art, tables, charts
Using Slide master, notes and handout master
Working with animation and transitions
Organize and Group slides
Import or create and use media objects: audio, video, animation
Perform slideshow recording and Record narration and create presentable videos

TOTAL: 30 PERIODS





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OUTCOMES

Upon completion of the course, Students will be able to,

- Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements.
- Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding.
- Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	2	1	2	-	3	-	-	-	1	3	-	2	2
2	3	3	2	2	3	-	-	-	-	2	1	2	2
3	2	1	2	-	3	-	-	-	2	3	-	2	2
AVG.	2.3	1.6	2	2	3	-	-	-	1.5	2.6	1	2	2

1-Low, 2-Medium, 3-High, "-" - No Correlation


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SEMESTER IV

23CET401

REINFORCED CONCRETE DESIGN

(IS 456: 2000 and SP 16 Code Books are to be Permitted)

L T P C

3 1 0 4

OBJECTIVES

- To inculcate the different types of philosophies related to design of basic structural elements.
- To impart knowledge on bond, anchorage, shear & torsion.
- To familiarize with the design of slab and staircase.
- To enhance the axial, uniaxial and biaxial eccentric loadings column.
- To foster the footing with reference to Indian standard code of practice.

UNIT I METHODS OF DESIGN OF CONCRETE STRUCTURES

9+3

Objective of structural design – Steps in RCC Structural Design Process – Type of Loads on Structures and Load combinations – Code of practices and Specifications – Concept of Working Stress Method, Ultimate Load Design and Limit State Design Methods for RCC – Properties of Concrete and Reinforcing Steel – Analysis and Design of Singly reinforced Rectangular beams by working stress method – Limit State philosophy as detailed in IS code – Advantages of Limit State Method over other methods – Analysis and design of singly and doubly reinforced rectangular beams by Limit State Method.

UNIT II LIMIT STATE DESIGN FOR BOND, ANCHORAGE SHEAR & TORSION

9+3

Behaviour of RC members in Shear, Bond and Anchorage – Design requirements as per current code – Behaviour of Rectangular RC beams in Shear and Torsion – Design of RC members for combined Bending, Shear and Torsion.

UNIT III LIMIT STATE DESIGN FOR FLEXURE AND STAIRCASE

9+3

Analysis and design of one way and two way rectangular slab subjected to uniformly distributed load for various boundary conditions and corner effects. Analysis and design of Flanged beams. Types of Staircases – Design of dog-legged Staircase.

UNIT IV LIMIT STATE DESIGN OF COLUMNS

9+3

Types of columns – Axially Loaded columns – Design of short Rectangular, Square and circular columns – Design of Slender columns – Design for Uniaxial and Biaxial bending using Column Curves.

UNIT V LIMIT STATE DESIGN OF FOOTING

9+3

Design of wall footing – Design of axially and eccentrically loaded rectangular footing – Design of combined rectangular footing for two columns only.

TOTAL: 45+15=60 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the various design methodologies for the design of RCC elements.
- Examine the shear, bond and torsion effects in beams.
- Design the various types of slabs, flanged beams and staircase by limit state method.
- Construct the columns for axial, uniaxial and biaxial eccentric loadings.
- Design of footing by limit state method.

TEXT BOOKS

1. Subramanian N, "Design of Reinforced Concrete Structures", Oxford University Press, Fifth Edition, 2019.
2. Krishnaraju N, "Design of Reinforced Concrete Structures", CBS Publishers & Distributors Pvt. Ltd., Sixth Edition, 2022.
3. Varghese P.C, "Limited State Design of Reinforced Concrete", Prentice Hall of India, Third Edition, 2020.

REFERENCES

1. Shah V L Karve S R, "Limit State Theory and Design of Reinforced Concrete Structures", S Chand Publishers, Sixth Edition, 2020.
2. Punmia.B.C, Ashok Kumar Jain, Arun Kumar Jain, "Limit State Design of Reinforced Concrete", Laxmi Publication Pvt. Ltd., Forth Edition, 2021.
3. Sinha N C Roy S K, "Fundamentals of reinforced concrete", S Chand Publishers, Third Edition, 2019.

E-RESOURCES

1. <https://nptel.ac.in/courses/105/105/105105105/> (Design of reinforced concrete structures)
2. <https://nptel.ac.in/courses/105/105/105105104/> (Design of concrete structures)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	3	-	2	1	1	1	1	2	3	3
2	3	3	3	3	-	2	1	1	1	1	2	3	3
3	3	3	3	3	-	2	1	2	1	2	2	3	3
4	3	3	3	3	-	2	1	2	1	2	3	3	3
5	3	3	3	3	-	2	1	2	1	2	3	3	3
AVG.	3	3	3	3	-	2	1	1.6	1.0	1.6	2.4	3	3

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS





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23CET402

STRUCTURAL ANALYSIS

L T P C

3 0 0 3

OBJECTIVES

- To inculcate the basic concepts of structural analysis and the classical methods for analysis of buildings.
- To impart knowledge on the method of drawing influence lines and its uses in various applications like beams, bridges and plane trusses.
- To familiarize with the analysis procedure using slope deflection method
- To enhance the analysis procedure using moment distribution method
- To acquire knowledge on three hinged and two hinged arches.

UNIT I FUNDAMENTALS OF STRUCTURAL ANALYSIS

9

Determination of static indeterminacy and kinematic indeterminacy – Deficiency for beams, frames and pin jointed trusses – Behaviors of Structures – Principle of superposition – Analysis of pin jointed space trusses by method of tension coefficient.

UNIT II INFLUENCE LINE FOR STATICALLY DETERMINATE STRUCTURES

9

Influence line for Statically Determinate Beams for Bending moment and Shear force – Muller Breslau's Principles – Influence lines for forces in members for statically determinate trusses – Parallel chord truss – Reversal of stresses – Focal length.

UNIT III SLOPE DEFLECTION METHOD

9

Slope deflection equations – Equilibrium conditions – Analysis of continuous beams and rigid frames – Rigid frames with inclined members – Support settlements – Symmetric frames with symmetric and skew – Symmetric loadings.

UNIT IV MOMENT DISTRIBUTION METHOD

9

Stiffness and carry over factors – Distribution and carryover of moments – Analysis of continuous beams – Plane rigid frames with and without sway – Support settlement – Symmetric frames with symmetric and skew – Symmetric loadings.

UNIT V ANALYSIS OF ARCHES

9

Analysis of three hinged arches of parabolic and circular profiles – Analysis of two hinged symmetric parabolic and circular arches. Settlement and temperature effects – Influence lines for bending moment, normal thrust and radial shear at sections of an arch.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Identify the static and kinematic indeterminacy of beam, truss and frame.
- Construct the influence line diagrams for determinate and indeterminate beams.
- Analyze the structures for internal forces by theorem of three moments and slope deflection method.
- Construct the structures for internal forces by Moment distribution method.
- Analyze the three hinged, two hinged, parabolic and circular arches.

TEXTBOOKS

1. Bhavikatti S.S, "Structural Analysis – Vol. I & II", Vikas Publishing Private Limited, Second Edition, 2019
2. Menon D, "Structural Analysis", Alpha Science International Limited, Ninth Edition, 2020.
3. Punmia B.C, Ashok Kumar J, Arun Kumar J, "Theory of Structures", Laxmi Publications, Third Edition, 2021.

REFERENCES

1. Wang, C.K, "Analysis of Indeterminate Structures", Tata McGraw-Hill Publishing Company, Sixth Edition, 2019.
2. Pandit.G.S, "Theory of Structures ,Vol. – I", McGraw Hill Education Private Limited, Fifth Edition, 2017.
3. Reddy.C.S, "Basic Structural Analysis", Tata Mc Graw Hill Publishing Company, Seventh Edition, 2020.

E-RESOURCES

1. [https://nptel.ac.in/courses/105/105/105105166/\(StructuralAnalysis I\)](https://nptel.ac.in/courses/105/105/105105166/(StructuralAnalysis I))
2. [https://nptel.ac.in/courses/105/101/105101085/\(StructuralAnalysis I\)](https://nptel.ac.in/courses/105/101/105101085/(StructuralAnalysis I))

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	3	-	1	-	1	1	1	2	3	3
2	3	3	2	3	-	1	-	1	1	1	2	3	3
3	3	3	2	3	-	1	-	1	1	1	2	3	3
4	3	3	2	3	-	1	-	1	1	1	3	3	3
5	3	3	2	3	-	1	-	1	1	1	3	3	3
AVG.	3	3	2	3	-	1	-	1	1	1	2.4	3	3

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS





23CET403

HIGHWAY ENGINEERING

L T P C

3 0 0 3

OBJECTIVES

- To inculcate the basics of highway planning and its alignment.
- To familiarize with the various highway cross sectional elements.
- To enhance the desirable properties of highway materials and construction practice.
- To impart knowledge on the rigid and flexible pavements.
- To acquire the pavement evaluation and strengthening methods.

UNIT I HIGHWAY PLANNING AND ALIGNMENT

9

Scope of Highway Engineering - Highway Development and Planning in India – Jayakar Committee Recommendations and Realizations - Requirements of Ideal Alignment - Factors Controlling Highway Alignment - Engineering Surveys for Alignment – Classification of Roads (IRC).

UNIT II GEOMETRIC DESIGN OF HIGHWAYS

9

Highway Cross Sectional Elements – Sight Distances – Design of Horizontal Alignment – PIEV Theory – Widening of Curves – Transition Curves – Design of Vertical Alignment – Gradient and Curves.

UNIT III HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE

9

Materials used in Highway Construction – Properties and Testing of Highway Materials – Features of Highway Construction.

UNIT IV FLEXIBLE AND RIGID PAVEMENTS

9

Flexible Pavements – Components and their Functions – Factors Affecting the Design of Flexible Pavements – Stresses in Flexible Pavement – Flexible Pavement Design Methods – Rigid Pavement - Components and their Functions – Factors Affecting the Design of Rigid Pavements – Stresses in Rigid (IRC Method and Recommendations).

UNIT V PAVEMENT MAINTENANCE AND EVALUATION

9

Types of Maintenance – Defects in Flexible Pavements – Types of Failures, Causes and Treatment – Defects in Rigid Pavement – Pavement Evaluation Techniques – Strengthening of Pavements.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Examine the best highway planning and alignment.
- Analyze the geometric design of highway cross sectional elements.
- Develop the highway construction materials and their properties.
- Design the flexible and rigid pavements as per IRC codes.
- Identify the highway maintenance, evaluation and strengthening.

TEXT BOOKS

1. Khanna S.K, Justo.C.E.G, Veeraragavan A, "Highway Engineering", Nemchand Publishers, Tenth Edition, 2021.
2. Kadiyali L.R ,Lal N.B, "Principles and Practice of Highway Engineering (Including expressways and Airport Engineering)", Khanna Publishers, Second Edition, 2019.
3. Partha Chakroborthy, Animesh Das, "Principles of Transportation Engineering", Prentice-Hall of India, Seventh Edition, 2020.

REFERENCES

1. Yang H Haung, "Pavement Analysis and Design", Pearson Education, Ninth Edition, 2019
2. Ian D Walsh, "ICE Manual of Highway Design and Management", ICE publishers, Thirteenth Edition, 2020.
3. Indian Road Congress (IRC), "Guidelines for the Design of Flexible Pavements", IRC:37-2012.

E-RESOURCES

1. <https://nptel.ac.in/courses/105/101/105101087/> (Pavement Design)
2. <https://nptel.ac.in/courses/105/105/105105107/> (Introduction to Transport Engineering)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	1	-	-	1	-	1	1	-	-	1	1
2	3	1	2	-	-	3	-	3	3	-	-	3	-
3	3	1	1	-	-	3	-	2	2	-	-	2	-
4	3	3	2	-	-	3	-	3	3	1	-	3	2
5	3	2	2	-	-	3	-	2	2	-	-	2	2
AVG.	3	1.8	1.6	-	-	2.6	-	2.2	2.2	1	-	2.2	1.7

1-Low 2-Medium 3-High '-' – No Correlation


Chairman - BoS





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23CEE401

FOUNDATION ENGINEERING (Lab Embedded Theory Course)

L T P C
3 0 2 4

OBJECTIVES

- To inculcate the methods of soil exploration.
- To enhance the necessity of settlement.
- To familiarize with the bearing capacity and settlement of shallow foundation.
- To impart knowledge on the pile foundation.
- To foster the stability analysis of slopes.
- To acquire knowledge on the various earth pressure theories.

UNIT I SOIL INVESTIGATION AND CHOICE OF FOUNDATION

9

Methods of Soil Exploration – Boring – Sampling – Disturbed and undisturbed Sampling – Sampling techniques – Bore log and soil investigation report – Function and requirements of good foundation – Choice of foundation based on soil conditions.

UNIT II BEARING CAPACITY AND SETTLEMENT

9

Location and depth of foundations – Bearing capacity of shallow foundations on homogeneous deposit–Terzaghis Theory – IS Code method – Problems – Field tests (SPT and SCPT) – Factors influencing Bearing Capacity – Settlement of foundations – Components of settlement – Allowable and maximum differential settlement.

UNIT III SHALLOW FOUNDATION

9

Types of footings – Contact pressure distribution: isolated footing – Combined footings – Proportioning – Mat foundation – Types and applications – Floating foundation.

UNIT IV PILE FOUNDATION

9

Need for deep foundations – Types of piles – Classification of piles – Load carrying capacity of piles in granular and cohesive soils – Static and Dynamic formulae – Pile carrying capacity by field tests – Pile load test – Group Capacity – Settlement of Pile groups – Negative skin friction – Introduction to pile raft.

UNIT V STABILITY OF SLOPES AND EARTH PRESSURE

9

Slopes – Infinite and finite slopes – Types of failure – Causes of failure – Procedure for slip circle method – Earth pressure in soils: active and passive states – Lateral earth pressure – Rankines theory– Graphical method – Stabilization of soil using various methods – Landslide – Mechanics of landslide.





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LIST OF EXPERIMENTS

1. Grain Size Distribution – Sieve Analysis.
2. Grain Size distribution – Hydrometer Analysis.
3. Specific Gravity of Soil.
4. Relative density of Sands.
5. Field Density by Core Cutter Method and Sand Replacement Method.
6. Atterbergs Limits Test.
7. Coefficient of Permeability – Variable and Constant Head Method.
8. Unconfined Compression Test.
9. Direct Shear Test.
10. Standard Proctor Compaction Test.

TOTAL: 45+15=60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the importance of soil investigation in various civil Engineering projects.
- Examine the bearing capacity incorporating IS codal provisions.
- Design the shallow foundation and get exposure in foundation analysis.
- Examine the pile group capacity and group efficiency for various types of soils.
- Construct the earth retaining structures for various soil conditions.
- Choose the correct soil methods in the field depending upon the requirement and site conditions.

TEXT BOOKS

1. Arora K.R, "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, Seventh Edition, 2019.
2. Punmia B.C, "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd., Sixteenth Edition, 2019.
3. Gopal Ranjan and Rao A.S.R, "Basic and applied Soil Mechanics", New Age International, Tenth Edition, 2020.

REFERENCES

1. Muni Budhu, "Soil Mechanics and Foundations", John Willey & Sons, Inc, Sixth Edition, 2020.
2. Kaniraj. S.R. "Design aids in Soil Mechanics and Foundation Engineering", Tata McGraw Hill publishing company Ltd., Fourth Edition, 2019.
3. Venkatramaiah C. "Geotechnical Engineering", New Age International, Fifth Edition, 2021.

E-RESOURCES

1. [https://nptel.ac.in/courses/105/105/105105176/\(FoundationEngineering\)](https://nptel.ac.in/courses/105/105/105105176/(FoundationEngineering))
2. [https://nptel.ac.in/courses/105/107/105107120/\(FoundationEngineering\)](https://nptel.ac.in/courses/105/107/105107120/(FoundationEngineering))





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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	3	-	2	1	1	1	1	1	3	2
2	3	3	3	3	-	2	1	1	1	1	1	2	3
3	3	3	3	3	-	2	1	1	1	1	2	2	3
4	3	3	3	3	-	1	1	1	1	1	2	2	3
5	3	3	3	3	-	2	1	1	1	1	2	2	3
6	3	3	3	3	-	2	1	1	1	1	2	2	3
AVG.	3	3	3	3	-	1.8	1	1	1	1	1.7	2.2	2.8

1-Low 2-Medium 3-High '-' – No Correlation


Chairman - BoS





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23CEE402

FLUID MECHANICS AND MACHINERY (Lab Embedded Theory Course) (Common to Civil and Mechanical Engineering)

L T P C
3 0 2 4

OBJECTIVES

- To inculcate the properties of fluid flow characteristics and its dynamics.
- To impart knowledge on the laminar and turbulent flow through circular conduits and losses in pipe flow.
- To familiarize with the dimensional and model analysis.
- To enhance the types of pumps, working principle, application and performance analysis of fluid pumps.
- To acquire knowledge on types of turbines, working principle, velocity triangle and performance curves of hydraulic turbines.
- To foster the principles studied in fluid mechanics theory by performing experiments in lab.

UNIT I FLOW CHARACTERISTICS AND DYNAMICS OF FLUID FLOW

9

Introduction - Properties of fluids - Flow characteristics - Rate of flow, concept of control volume and continuity equation for one dimensional flow. Dynamics of fluid flow - Euler's equation of motion, Bernoulli's equation and its application.

UNIT II FLUID FLOW TYPES AND FLOW THROUGH PIPES

9

Flow of viscous fluid through circular pipe- Hagen Poiseuille equation - Types of fluid flow - Steady and unsteady, Uniform and non-uniform, Laminar and Turbulent, Compressible and incompressible, Rotational and irrotational (Qualitative treatment). Flow through pipes (Loss of energy in pipes) - Major losses - Darcy-Weisbach equation and Chezy's formula - Minor losses - Moody diagram (Qualitative treatment) - Flow through pipes in series and in parallel.

UNIT III DIMENSIONAL AND MODEL ANALYSIS

9

Introduction - Derived quantities - Dimensional Homogeneity - Method of dimensional analysis - Rayleigh's method and Buckingham's π -theorem. Similitude - Types of similitude - Dimensionless numbers - Model laws - Application of dimensionless parameters - Model analysis.

UNIT IV HYDRAULIC PUMPS

9

Classification of pumps - Centrifugal pumps - Working principle - Heads and efficiencies- Velocity triangles - Work done by the impeller - Performance curves - Reciprocating pump working principle - Indicator diagram and its variations - Work saved by fitting air vessels - Rotary pumps.





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UNIT V HYDRAULIC TURBINE

9

Impact of jets - Velocity triangles - Theory of rotodynamic machines - Classification of turbines - Working principles - Pelton wheel - Modern Francis turbine - Kaplan turbine - Work done - Efficiencies - Draft tube - Specific speed - Performance curves for turbines.

LIST OF EXPERIMENTS

1. Coefficient of discharge of Venturi meter.
2. Coefficient of discharge of Orifice meter.
3. Determination of friction factor for a given set of pipes.
4. Determination of co-efficient of discharge for an external mouth piece.
5. Performance test on centrifugal pump.
6. Performance test on reciprocating pump.
7. Performance test on gear pump.
8. Performance analysis of Pelton wheel.
9. Performance analysis of Francis turbine.
10. Performance analysis of Kaplan turbine.

TOTAL: 45+15=60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the dynamics of fluid flow and summarize the flow characteristics.
- Identify the concept of flow characteristics and calculate major and minor losses associated with pipe flow in piping networks.
- Examine the concept of model analysis, including how physical models are scaled and tested to simulate the real world fluid flow problems.
- Develop the performance of pumps.
- Construct the operating principles of various turbines and how they convert energy from fluids into mechanical work.
- Apply the Bernoulli's principle to find the coefficient of discharge, determine the friction factor for set of pipes, and analyze the performance characteristics of turbine and pumps.

TEXT BOOKS

1. Bansal R.K, "Fluid Mechanics and Hydraulic Machines", Laxmi Publications, Ninth Edition, 2019.
2. Modi P.N and Seth S.M, "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House, Twenty Second Edition, 2019.
3. Rajput R.K, "Fluid Mechanics and Hydraulic Machines", S. Chand Publishing Limited, Sixth Edition, 2021.





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REFERENCES

1. K.L Kumar, "Engineering Fluid Mechanics", Eurasia Publishing House (P) Ltd., Seventh Edition, 2019.
2. Giles, R.V, Evett, J.B & Liu C, "Fluid Mechanics and Hydraulics", Tata McGraw Hill, Second Edition, 2020.
3. Khurmi R S, "Fluid mechanics & hydraulic Machines. (in S.I. units)", S Chand & Company Limited, Third Edition, 2019.

E-RESOURCES

1. [https://nptel.ac.in/courses/112/105/112105171/-](https://nptel.ac.in/courses/112/105/112105171/) (Fluid Mechanics)
2. [https://nptel.ac.in/courses/112/105/112105182/-](https://nptel.ac.in/courses/112/105/112105182/) (Introduction to Fluid Mechanics and Compressible flow)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	2	-	2	2	-	2	-	-	3	2
2	3	3	2	2	-	2	2	-	2	-	-	3	2
3	3	3	2	2	-	2	2	-	2	-	-	3	2
4	3	3	2	2	-	2	2	-	2	-	-	3	2
5	3	3	2	2	-	2	2	-	2	-	-	3	2
6	3	3	2	2	-	2	2	-	2	-	-	3	2
AVG.	3	3	2	2	-	2	2	-	2	-	-	3	2

1- Low 2- Medium 3- High '-' – No Correlation


Chairman - BoS





23GEE301

**PROBLEM SOLVING AND PYTHON
PROGRAMMING**
(Lab Embedded Theory Course)

L T P C
3 0 2 4

OBJECTIVES

- To impart the fundamentals of computational thinking, algorithm design, and problem-solving techniques for developing efficient software solutions.
- To develop students proficiency in Python programming using data types, expressions, operators, statements, and debugging techniques.
- To enable students to apply control structures, functions, recursion, and string manipulation for solving computational problems.
- To train students to use lists, tuples, dictionaries, and advanced data processing techniques for structured programming.
- To inculcate the knowledge of file handling, exception handling, modules, packages, and data visualization for developing robust Python applications.
- To develop the students in analytical, programming, and computational skills through coding practices, and to solve real-world problems using Python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING

9

Fundamentals of Computing – Identification of Computational Problems –Algorithms, building blocks of algorithms(statements, state, control flow, functions),notation(pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

Coding practices:

1. Develop Algorithm and flowchart to find the greatest of three numbers.
2. Develop Algorithm and flowchart to find a minimum number in a List.

Problem-solving Assignments:

1. Develop Algorithm and Flowchart to solve Towers of Hanoi Problem.
2. Develop Algorithm, Pseudo code and flowchart for finding factorial of a given number using recursion.

UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS

9

Python interpreter and interactive mode, debugging; values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points

Coding practices:

1. Develop python program to find area of a Circle
2. Develop python program to convert Fahrenheit to Celsius.





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Problem-solving Assignments:

1. Develop Python program to find Quadratic Equation
2. Develop Python program to find Student mark statement based on 5 subjects.

UNIT III CONTROL FLOW, FUNCTIONS, STRINGS

9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

Coding practices:

1. Develop python program to find GCD of a given number.
2. Develop python program to find factorial of a number.
3. Develop Python program to find sum of array of given numbers.

Problem-solving Assignments:

1. Develop Python program to find whether an element is found in the List by using (A) Linear Search and (B) Binary Search method
2. Develop Python program to print Fibonacci Series

UNIT IV LISTS, TUPLES, DICTIONARIES

9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

Coding practices:

1. Develop python program for Insertion Sorting & Selection Sorting.
2. Develop python program for Histogram

Problem-solving Assignments:

1. Develop Python program for student mark statement using List
2. Develop Python program to print Retail bill statement

UNIT V FILES, MODULES, PACKAGES & DATA VISUALIZATION

9

Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file :- Importing Matplotlib – Introduction to plotting – visualizing errors – Histograms.

Coding practices:

1. Develop python program to append the contents of one file to another.
2. Develop python program to copy contents of one file to another file using command Line Arguments





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Problem-solving Assignments:

1. Develop a python program for calculator using python packages.
2. Develop a suitable python program to demonstrate each case in Exceptional Handling.
3. Develop a suitable python program using Matplotlib for Visualizing Errors.

LIST OF EXPERIMENTS

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops.(Number series, Number Patterns, pyramid pattern)
4. Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)
5. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementing programs using Functions.(Factorial, largest number In a list, area of shape)
7. Implementing programs using Strings.(reverse,palindrome,charactercount,replacingcharacters)
8. Implementing programs using written modules and Python Standard Libraries (pandas, numpy, Matplotlib, scipy)
9. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
10. Implementing real-time/technical applications using Exception handling.(divide by zero error, voter's age validity, student mark range validation)

TOTAL: 45 + 15 = 60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze computational problems to develop effective problem-solving strategies.
- Apply python constructs to develop programs for python applications.
- Apply control structures and functions to solve computational problems.
- Apply Python built-in data structures such as lists, tuples, and dictionaries to process and manipulate data efficiently.
- Analyze the operations of file handling, exception handling, modules, packages, and data visualization techniques for real-world applications.
- Implement python programs for solving various computational problems.





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TEXTBOOKS

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", O'Reilly Publishers, Second Edition, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", BCS Learning & Development Limited, First Edition, 2017.

REFERENCES

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, First Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", Notion Press, First Edition, 2021.

E – RESOURCES

1. <https://nptel.ac.in/courses/106104074> (Introduction to Algorithms)
2. <https://archive.nptel.ac.in/courses/106/106/106106182/> (Joy of Computing)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	1	2	–	–	–	–	–	2	–	1
2	3	2	2	–	3	–	–	–	–	–	2	–	1
3	3	3	2	1	3	–	–	–	–	–	2	–	1
4	3	2	2	–	3	–	–	–	–	–	2	–	1
5	2	3	2	2	3	–	–	–	1	–	2	–	1
6	3	3	3	2	3	–	1	1	2	1	2	–	1
AVG.	2.8	2.7	2.2	1.5	2.8	–	1	1	1.5	1	2	–	1.0

1 – Low, 2 – Medium, 3 – High, '–' No Correlation

Chairman - BoS





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23EEC401

ONLINE CERTIFICATION COURSES

L T P C
3 0 0 3

Students may be permitted to study online courses (NPTEL, SWAYAM or any Proctored Assessment Certification Courses) with 3 credits during the 4th semester curriculum for all B.E./B.Tech. Programmes. Such courses offered to students shall be recommended by the Department Academic Committee (DAC). The DAC shall ensure that the courses offered are not core courses in their respective curriculum.

The number of credits and transfer of credits are based on the procedure explained in following Table. The mapping of marks with grades is applicable only if the student passes the course as per the guidelines of NPTEL.

S.No.	No. of Weeks	Credits
1	4	1
2	8	2
3	12	3
4	16	4


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SEMESTER V

23CET501

DESIGN OF STEEL STRUCTURES

L T P C

(IS 800 – 2007, IS 875 – 1987 and Steel Tables are to be Permitted) 3 1 0 4

OBJECTIVES

- To instruct the design of bolted and welded connections.
- To explore the connections in tension members.
- To impart knowledge on the single section and compound section compression members
- To acquire the behavior of flexural members and design the beams.
- To gain knowledge on the design of industrial buildings.

UNIT I INTRODUCTION

9+3

Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on structures – Connections using rivets, welding, bolting – Design of bolted and welded joints – Eccentric connections – Efficiency of joints.

UNIT II TENSION MEMBERS

9+3

Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag.

UNIT III COMPRESSION MEMBERS

9+3

Types of compression members – Theory of columns – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of laced and battened type columns – Design of column bases – Gusseted base.

UNIT IV BEAMS

9+3

Design of laterally supported and unsupported beams – Built up beams – Beams subjected to uniaxial and biaxial bending – Design of plate girders – Intermediate and bearing stiffeners – Flange and web splices – Introduction to tubular sections.

UNIT V ROOF TRUSSES AND INDUSTRIAL STRUCTURES

9+3

Roof trusses – Roof and side coverings – Design of purlin and elements of truss; End bearing – Design of gantry girder – Metro Station roof and truss – Arches.

TOTAL: 45+15=60 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Construct the behaviour of bolted and welded connections.
- Analyze the concept of shear lag in design of tension members.
- Design compression members using simple and built-up sections.
- Analyze the beams subjected to uniaxial and biaxial bending
- Examine the Industrial structures and their components.

TEXT BOOKS

1. Subramanian.N, "Design of Steel Structures", Oxford University Press, Second Edition, 2019.
2. Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company, Third Edition, 2019.
3. Upadhyay. A.K, "Steel Structures (Design and Drawing)", Katson Books, Fifth Edition, 2019.

REFERENCES

1. Bhavikatti.S.S, "Design of Steel Structures by Limit State Method as per IS:800 – 2007", IK International Publishing House Pvt. Ltd., Fifth Edition, 2019.
2. Gambhir. M.L., "Fundamentals of Structural Steel Design", McGraw Hill Education India Pvt. Ltd., Second Edition, 2019.
3. Wang. L, "Design of Steel Structures", Scitus Academics, Second Edition, 2019.

E-RESOURCES

1. [https://nptel.ac.in/courses/105/105/105105162/\(Design of steel structures\)](https://nptel.ac.in/courses/105/105/105105162/(Design%20of%20steel%20structures))
2. [https://nptel.ac.in/courses/105/106/105106113/\(Design of steel structures II\)](https://nptel.ac.in/courses/105/106/105106113/(Design%20of%20steel%20structures%20II))

Mapping of COs-POs& PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	3	-	-	-	-	-	-	-	-	2	2
2	3	2	3	-	-	-	-	-	-	-	-	2	2
3	3	2	3	-	-	-	-	-	-	-	-	2	2
4	3	2	3	-	-	-	-	-	-	-	-	2	2
5	3	2	3	-	-	-	-	-	-	-	-	2	2
AVG.	3	2	3	-	-	-	-	-	-	-	-	2	2

1 - Low, 2 - Medium, 3 - High, '-' - No correlation


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23CEE501

CONCRETE TECHNOLOGY

L T P C

(Lab Embedded Theory Course)

3 0 2 4

(IS: 10262- 2009 Code Book is to be Permitted)

OBJECTIVES

- To inculcate the different types and properties of cement.
- To develop the properties of concrete making materials.
- To instruct the concrete mix design.
- To enhance the behaviour of concrete at the fresh and hardened state.
- To explore the special concretes as per requirements.
- To acquire practical skills on the parameters of concrete to check its quality.

UNIT I PROPERTIES OF CEMENT

9

Manufacturing of Cement by wet and dry Process, Types of cement – Properties of Cement – Heat of Hydration – Test on Cement – Field Test – Laboratory Testing Methods – Fineness of cement, Consistency of cement, Specific Gravity of cement, Setting properties of cement, Soundness of cement and compressive strength of cement mortar.

UNIT II AGGREGATES AND ADMIXTURES

9

Fine aggregate and coarse aggregate – Properties and testing methods of fine aggregates(M – Sand and P – Sand) – Fineness modulus – Bulking of Sand – Sieve analysis – Properties and testing methods of coarse aggregates – Crushing test, Abrasion test, Impact test, Specific gravity and water absorption test – Mineral and chemical admixture.

UNIT III MIX DESIGN AND CONCRETE PRODUCTION

9

Selection of materials for concrete – Water cement ratio – Concrete mix design – Concepts variables in proportioning – Methods of mix design – Indian Standard method, Factor affecting the test results, process of manufacture of concrete – Properties of fresh concrete – Workability – Measurement of workability – Statistical and quality control of concrete – Outline the design of Ready mix concrete.

UNIT IV STRENGTH OF CONCRETE

9

Strength of concrete – Gain of strength with age – Testing of hardened concrete – Compressive strength – Tensile strength – Flexural strength – Modulus of elasticity of concrete – Stress and Strain characteristics. Introduction to NDT Techniques – Rebound hammer and Ultrasonic pulse velocity test.





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UNIT V SPECIAL CONCRETES

9

Introduction to Polymer concrete, High performance concrete – High strength concrete – Fibre reinforced concrete – Light weight concrete – Ready mix concrete and pumping of concrete.

LIST OF EXPERIMENTS

1. Fineness Test on Cement.
2. Consistency, Initial and Final Setting Time Test on Cement.
3. Specific Gravity and Fineness Modulus Test on Fine aggregate.
4. Water Absorption and Specific Gravity Test on Coarse Aggregate.
5. Crushing Strength and Impact Strength Test on Coarse Aggregate.
6. Slump Value on Fresh Concrete.
7. Vee – Bee Test on Fresh Concrete.
8. Compaction Factor Test on Fresh Concrete.
9. Compressive Strength on Concrete Cube and Cylinder.
10. Flexural Strength on Concrete Prism.

TOTAL: 45+15=60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Construct the properties of cement.
- Analyze the properties of aggregates and admixtures.
- Examine the IS mix design and quality control of concrete.
- Identify the properties of hardened concrete.
- Analyze the selection of suitable special concrete.
- Develop the strength characteristics of the given concrete materials.

TEXT BOOKS

1. Gambir M. L, "Concrete Technology", Tata MC-Graw Hill-Education, Fifth Edition, 2019.
2. Shetty M.S., "Concrete Technology", S. Chand & Company Ltd., Eighth Edition, 2020.
3. Krishnaraju N., "Advanced Concrete Technology", CBS Publishers, Fourth Edition, 2018.

REFERENCES

1. Santhakumar A. R., "Concrete Technology", Oxford University Press, Fourth Edition, 2019.
2. Neville A.M., "Properties of Concrete", Pearson England Limited, Second Edition, 2020.
3. Yates J K, "Sustainability in Engineering Design and Construction", CRC Press, Eleventh Edition, 2019.





E-RESOURCES

1. <https://nptel.ac.in/courses/105/102/105102012/>(Concrete Technology)
2. <https://nptel.ac.in/courses/105/106/105106176/>(Advance Concrete Technology)

Mapping of COs-POs& PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	2	-	2	2	-	-	-	2	3	2
2	3	2	2	2	-	2	2	-	-	-	2	3	2
3	3	2	2	2	-	2	2	-	-	-	2	3	2
4	3	2	2	2	-	2	2	-	-	-	2	3	2
5	3	2	2	2	-	2	2	-	-	-	2	3	2
6	3	2	2	2	-	2	2	-	-	-	2	3	2
AVG.	3	2	2	2	-	2	2	-	-	-	2	3	2

1 - Low, 2 - Medium, 3 - High, '-' - No correlation


Chairman - BoS





23CEE502

WATER SUPPLY AND WASTE WATER ENGINEERING
(Lab Embedded Theory Course)

L T P C
3 0 2 4

OBJECTIVES

- To familiarize on the principles of water supply system and planning the sources.
- To instruct the conveyance system of water.
- To inculcate the treatment of water.
- To enhance the physical, chemical and biological characteristics of waste water and their sources.
- To explore the various disposal methods of sewage.
- To acquire practical skills the water and waste water quality tests as per IS Standards.

UNIT I PLANNING FOR WATER SUPPLY SYSTEM

9

Public water supply system – Planning – Objectives – Design period – Population forecasting – Water demand – Sources of water and their characteristics – Surface and groundwater – Impounding Reservoir Well hydraulics – Development and selection of source – Water quality – Characterization and standards – Impact of climate change.

UNIT II CONVEYANCE SYSTEM

9

Water supply – Intake structures – Functions and drawings – Pipes and conduits for water – Pipe materials – Hydraulics of flow in pipes – Transmission main design – Laying, jointing and testing of pipes – Drawings appurtenances – Types and capacity of pumps – Selection of pumps and pipe materials.

UNIT III WATER TREATMENT

9

Objectives – Unit operations and processes – Principles, functions design and drawing of Chemical feeding, Flash mixers, flocculators, sedimentation tanks and sand filters – Disinfection – Residue Management – Construction and Operation & Maintenance aspects of Water Treatment Plants.

UNIT IV SEWAGE AND DESIGN OF SEWERS

9

Sources of wastewater – Quantity of sanitary sewage – Storm water runoff estimation – Wastewater characteristics and significance – Design of sewers -- Laying, jointing and testing of sewers– Sewer appurtenances – Pump selection.

UNIT V SEWAGE DISPOSAL

9

Disposal on land – Sewage farming – Disposal into water bodies – Oxygen sag curve – Streeter Phelps model – Wastewater reclamation techniques – One pipe and two pipe system – Soil dispersion system – Mass balance principle.





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LIST OF EXPERIMENTS

1. Determination of turbidity by using nephelometer.
2. Measurement of pH and conductivity of water sample.
3. Determination of hardness by EDTA method.
4. Determination of alkalinity.
5. Determination of acidity in water.
6. Determination of chlorides.
7. Determination of residual chlorine.
8. Determination of electrical conductivity.
9. Determination of BOD for the given sample.
10. Determination of COD for given sample

TOTAL: 45+15=60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Classify the water supply system, water sources and water quality characteristics and standards.
- Apply the concepts of water conveyance systems.
- Examine the various treatments for water supply.
- Develop the basic characteristics and sources of wastewater.
- Analyze the suitable sewage disposal methods.
- Identify the water and waste water quality testing for various standards.

TEXT BOOKS

1. Modi, P.N. "Water Supply Engineering", Vol. I Standard Book House, Third Edition, 2021.
2. Garg, S.K., "Environmental Engineering", Vol. II, Khanna Publishers, Fifth Edition, 2019.
3. Gaur R.C., "Basic Environmental Engineering", New Age International Publishers, Seventh Edition, 2020.

REFERENCES

1. Government of India, "Manual on Water Supply and Treatment", CPHEEO, Ministry of Urban Development, 2017.
2. Syed R. Qasim "Wastewater Treatment", CRC Press, Washington D.C., Ninth Edition, 2019.
3. Gaur R.C., "Environmental Engineering and Disaster Management", New Age International Publishers, Ninth Edition, 2021.





E-RESOURCES

1. <https://nptel.ac.in/courses/103/107/103107084/>(Environmental Engineering)
2. <https://nptel.ac.in/courses/105/106/105106119/>(Water and Waste Water Engineering)

Mapping of COs-POs& PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	1	-	2	-	1	1	-	2	2	2
2	3	2	2	1	-	2	-	1	1	-	2	2	2
3	3	2	2	1	-	2	-	1	1	-	2	2	2
4	3	2	2	1	-	2	-	1	1	-	2	2	2
5	3	2	2	1	-	2	-	1	1	-	2	2	2
6	3	2	2	1	-	2	-	1	1	-	2	2	2
AVG.	3	2	2	1	-	2	-	1	1	-	2	2	2

1 - Low, 2 - Medium, 3 - High, '-' - No correlation


Chairman - BoS





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23EEEC503

INDUSTRIAL TRAINING / SURVEY CAMP

L T P C

0 0 4 2

OBJECTIVES

- To learn the practical exposure on the application of various basic principles of survey in the field.
- To understand the various simple surveying techniques, both in field and construction industries.
- To know the longitudinal and cross sectioning.
- To study the horizontal and vertical angles for triangulation work.
- To learn experience for handle modern surveying equipments using total station.

LIST OF EXPERIMENTS

Survey camp using theodolite, leveling and total station. At the end of the camp, each student shall have plot the contour map and calculate the area. The camp record shall include all original field observations, calculations and plots.

1. Triangulation.
2. Trilateration.
3. Contouring.
4. Co-ordinates and distance measurement with GPS.
5. Distance and angular measurement using total station.

OUTCOMES

Upon the completion of the course, the students will be able to:

- Calculate the area of various construction project sites.
- Estimate the volume of earthwork required and planned the layout of engineering projects.
- Prepare detailed topographical map of the area.
- Examine the distance measurement with GPS.
- Setting out curves by using total station.

Mapping of COs-POs& PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	1	2	2	2	-	2	-	2	2	3	2
2	3	2	1	2	2	2	-	2	-	2	2	3	2
3	3	2	1	2	2	2	-	2	-	2	2	3	2
4	3	2	1	2	2	2	-	2	-	2	2	3	2
5	3	2	1	2	2	2	-	2	-	2	2	3	2
AVG.	3	2	1	2	2	2	-	2	-	2	2	3	2

1 - Low, 2 - Medium, 3 - High, '-' - No correlation

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SEMESTER VI

23CET601

ESTIMATION AND QUANTITATIVE SURVEYING

L T P C
3 0 0 3

OBJECTIVES

- To impart knowledge on the basic concepts related to estimate preparation.
- To familiarize the rate of a work item according to the specification.
- To inculcate the concepts behind the preparation and estimation of the various civil engineering works.
- To enhance the terminologies and concepts related to valuation of properties, depreciation and time value of money.
- To foster the ability to prepare technical reports and contract documents as per standard requirements.

UNIT I INTRODUCTION TO ESTIMATES AND SPECIFICATIONS

9

General introduction to Quantity surveying – Purpose of estimates – Types of estimates, various items to be included in estimates – Principles in selecting units of measurement for items, various units and modes of measurement for different trades – I.S. 1200, Specifications – Purpose and basic principles of general and detailed specifications – Detailed specifications for various items of work.

UNIT II RATE ANALYSIS AND TENDERS

9

Standard Data – Observed Data – Standard schedule of rates – Market rates – Standard Data for Man Hours and Machineries for common civil works of rates – Hour costs based on total costs and outputs, rates for various items of construction of civil engineering works - TTT Act 2000 – Tender Notice – Types – Tender procedures – Drafting Model tenders- E-Tendering– Digital signature Certificates.

UNIT III ESTIMATION OF CIVIL ENGINEERING WORKS

9

Reading and interpretation of architectural and structural drawings – Detailed estimate of masonry buildings, R.C.C works, Preparation of schedule for steel as reinforcement – Preparation of bills of quantities – Approximate estimates, purpose, various methods used for buildings and other civil engineering works such as culvert and road projects – Estimating of irrigation works – Aqueduct, siphon.

UNIT IV VALUATION

9

Principles of valuation, definition of value, price and cost – Attributes of value, Different types of values – Valuer and his duties, purpose of valuation and its function. Factors affecting the valuation of properties – Free hold and leasehold properties, different types of lease – Methods of valuation – Forms of rent, different types of rent – Carpet area basis, unit basis, cubic content basis – Sinking fund, Depreciation.

UNIT V REPORT PREPARATION AND CONTRACTS

9

Principles for report preparation – Report on estimate of residential building – Culvert – Roads – Water supply and sanitary installations – Tube wells – Open wells. Contract –





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Types of contracts – Formation of contract – Contract conditions – Contract for labour, material, design, construction – Drafting of contract documents based on IBRD / MORTH Standard bidding documents – Construction contracts – Contract problems – Arbitration and legal requirements.

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the estimate corresponding to the required specification.
- Examine the rates of various work items in civil engineering works and familiarized with tendering and contracts.
- Evaluate the bills of quantities in construction works.
- Identify the value of properties considering various influencing factors.
- Construct the report and contracts for various construction works.

TEXTBOOKS

1. Dutta, B.N., "Estimating and Costing in Civil Engineering (Theory and Practice)", UBS Publishers & Distributors Pvt. Ltd., Twenty Eighth Edition, New Delhi, 2016.
2. Birdie .G.S, "Text Book on Estimating and Costing", Dhanpat Rai Publishing Company, Tenth Edition, New Delhi, 2015.
3. Kohli, D.D and Kohli, R.C., "A Text Book of Estimating and Costing (Civil)", S.Chand & Company Ltd., Seventh Edition, New Delhi, 2015.

REFERENCES

1. Rangwala .S.C., "Estimating, Costing and Valuation", Charotar Publishing House, Seventeenth Edition, 2017.
2. Tamilnadu Transparencies in Tender Act, 1998.
3. Standard Bid Evaluation Form, Procurement of Goods or Works, The World Bank, April 1996.

E-RESOURCES

1. [https://nptel.ac.in/courses/105/103/105103093/\(Construction Planning and Management\)](https://nptel.ac.in/courses/105/103/105103093/(Construction%20Planning%20and%20Management))
2. <https://nptel.ac.in/content/storage2/courses/105103023/pdf/mod5.pdf>
(Construction Economics)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	3	1	-	-	-	-	1	2	2	3	3
2	3	2	3	1	-	-	-	-	1	3	3	2	3
3	3	2	3	1	-	-	-	-	1	2	2	3	3
4	3	3	2	1	-	-	-	-	1	2	2	2	3
5	3	2	3	1	-	-	-	-	2	3	3	2	3
AVG.	3	2.2	2.8	1	-	-	-	-	1.2	2.4	2.4	2.4	3

1-Low 2-Medium 3-High '-' – No Correlation

[Signature]
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23CEE601

BUILDING PLANNING AND DRAWING (Lab Embedded Theory Course)

L T P C
3 0 2 4

OBJECTIVES

- To inculcate knowledge on the necessity and key definitions of Building Bye-Laws.
- To impart knowledge on the essential principles of architectural planning.
- To familiarize with the planning requirements for residential rooms.
- To enhance the ability to plan and design of institutional and commercial buildings.
- To develop proficiency in preparing layout drawing for essential building services.
- To provide hands-on experience in generating working drawings using CADD software.

UNIT I BUILDING BYE-LAWS

9

Introduction and Necessity of Bye-Laws; Plinth Area; Floor Area Ratio or Floor Space Index; Carpet Area; Setback; Open Space; Habitable Room; General Requirements for Plot; Minimum Room Sizes; Ventilation and Lighting Standards; Regulations on Building Height, Area Restrictions and Fire Safety Norms; Submission Procedure and Documentation Required for Plan Approval.

UNIT II FUNDAMENTALS OF ARCHITECTURAL PLANNING

9

Study of the Essential Principles of Planning: Aspect, Prospect, Grouping, Privacy, Sanitation and Circulation; Factors Affecting Planning, Climatic Conditions, Orientation, Site Characteristics, and Cost Constraints; Functional Design Requirements of Building Components of Doors, Windows, Walls, Floors; Introduction to Different Types of Scales, Conventional Signs, and Symbols used in Architectural Drawing; Professional Drafting Standards.

UNIT III RESIDENTIAL BUILDING DESIGN AND LINE PLANNING

9

Types of Residential Buildings (Single-Storey, Apartments); Planning Requirements for Various Rooms (Living, Dining, Bedroom, Kitchen, Staircase); Developing a Line Plan based on Room Inter-Relationship and Circulation; Conversion of the Line Plan into a Working Plan showing Walls, Doors, Windows, and Projections; Sectional Views, Elevation Drawing, and Dimensioning Standards for Residential Structures.

UNIT IV PLANNING OF PUBLIC AND INSTITUTIONAL BUILDING

9

Special planning considerations for large structures: Parking, Public Access, Fire Escapes, and Wide Corridors; Planning requirements for Educational Buildings (Classrooms, Labs, Libraries); Basic Planning for Health Care Facilities (Clinics, PHC); Planning for Commercial Complexes and Offices; Compliance with Barrier-Free Design and Accessibility Standards.

UNIT V BUILDING SERVICE LAYOUT AND CADD LAYOUT

9

Planning for Water Supply (tanks, sumps) and Plumbing Layout (Drainage, Soil, Waste, Vent Pipes and Location); Planning for Electrical and Lighting Layout (Points, Sockets, Switchboards, Conduit Routing); Introduction to CADD software interface, basic commands, and drawing settings; CADD techniques: layer management, drawing commands (Line, Offset, Trim), Blocks, Hatching, and Dimensioning; Final Output Plotting and Printing.





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LIST OF EXPERIMENTS

1. Preparation of standard symbols and signs used in building drawing.
2. Sketching and drafting of different types of doors and windows.
3. Drafting a stair and stair case.
4. Drafting of a line plan and working plan for a single-roomed residential building (scaled).
5. Drafting of the complete plan, elevation and a section for the residential building.
6. Preparation of the plan and section of a septic tank and soak pit.
7. Preparation of an integrated plumbing/sanitary layout for G+1 residential building.
8. Drafting of a public building plan showing all required facilities.

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the parameters and prepare basic documentation for plan approval.
- Analyze the influence of site and climate, and use conventional signs and symbols in drawings.
- Develop a Line Plan and convert it into a complete dimensioned Working Plan with section and elevation views.
- Design appropriate layouts for public and institutional buildings adhering to specific functional and safety requirements.
- Construct the essential building service layouts (plumbing, electrical) into the architectural plan.
- Apply the CADD software to efficiently draft, dimension, and plot professional working drawings.

TEXT BOOKS

1. Shah, M. G., Kale, C. M., & Patki, S. Y. "Building Drawing with an Integrated Approach to Autocad", Tata McGraw Hill Education Pvt. Ltd., Sixth Edition, 2019.
2. Varghese, P. C., "Building Construction", Prentice Hall of India, Second Edition, 2009.
3. Kumara Swamy N. and Kameswara Rao, A., "Building Planning and Drawing", Charotar Publishing House Pvt. Ltd., Ninth Edition, 2023.

REFERENCES

1. Gurucharan Singh and Jagdish Singh, "Building Planning, Designing and Scheduling", Standard Publishers Distributors, Fourth Edition, 2006.
2. B. C. Punmia, Ashok Kumar Jain, & Arun Kumar Jain, "Building Construction", Laxmi Publications Pvt. Ltd, Twelfth Edition, 2025.
3. Local Building Bye-Laws/NBC 2016 (National Building Code of India) relevant sections.





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E-RESOURCES

1. <https://nptel.ac.in/courses/105102088> (Building Materials and Construction)
2. <https://nptel.ac.in/courses/105107156> (Architecture - Building Science and Planning)

Mapping of COs - POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	-	-	3	-	1	2	2	-	3	2
2	3	3	3	2	-	2	-	1	2	3	-	3	2
3	3	3	3	2	3	2	-	1	3	3	-	3	3
4	3	3	3	2	-	3	-	1	2	2	-	3	3
5	3	3	3	2	3	2	-	1	3	2	-	3	3
6	3	2	2	1	3	-	-	1	3	3	-	3	3
AVG.	3	2.7	2.7	1.8	3	2.4	-	1	2.5	2.5	-	3	2.7

1-Low 2-Medium 3-High '-' – No Correlation


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TIRUCHENGODE- 637 205



23EEJ601

PROJECT WORK – PHASE I

L T P C

0 0 8 4

OBJECTIVES

- To develop knowledge to formulate a real world problem and projects goals.
- To identify the various tasks of the project to determine standard procedures.
- To identify and learn new tools, algorithms and techniques.
- To understand the various procedures for validation of the product and analysis the cost effectiveness.
- To understand the guideline to Prepare report for oral demonstrations.

PROCESS DESCRIPTION

- For Project work out of 100 marks, the maximum marks for Continuous Internal Assessment is fixed as 60 and the End Semester Examination (project report evaluation and viva voce examination) carries 40 marks. Project work shall be assigned to a single student.
- The project work shall be undertaken by students either in industry or in the college.
- The total credit for project work in semester is 4.
- There shall be three reviews (Zeroth Review, (Review I and Review II, each 100 marks)) during the semester by a review committee. The student shall make presentation on the progress made before the committee. The Head of the Department shall constitute a review committee for each programme. There shall be a minimum of three members in the review committee.
- The committee shall consist of the Supervisor, Project Coordinator and one of the faculty members.
- The student(s) is expected to submit the project report on or before the last working day of the semester. The ESE for the project work shall consist of the evaluation of the final project report submitted by the student or students of the project group by an external examiner, followed by a viva-voce examination conducted separately for each student by a committee consisting of the external examiner and an internal examiner (other than supervisor). The project coordinator shall be the internal examiner. The COE shall appoint the External Examiner for the ESE of the Project Work. The project report shall be submitted as per the approved guidelines given by Controller of Examinations.


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OUTCOMES

Upon completion of the course, the students will be able to:

- Formulate real-world problems.
- Design and express technical solutions using appropriate tools and techniques.
- Test and validate prototypes for efficiency and cost-effectiveness, and present their work effectively through reports and oral demonstrations.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
Mapping outcome	3	3	3	3	3	3	3	3	3	3	3	3	3

1-Low, 2-Medium, 3-High, “-“ - No Correlation


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SEMESTER VII

23HST701

HUMAN VALUES AND ETHICS

L T P C

3 0 0 3

OBJECTIVES

- To introduce students to the core democratic values such as equality, liberty, justice, pluralism, and citizen participation through key world democratic movements.
- To familiarize students with the concept of secular values and the interpretation of secularism in the Indian context, emphasizing state neutrality and non-discrimination.
- To develop scientific values by introducing scientific thinking, methods of inquiry, hypothesis testing, skepticism, empiricism, and rationalism.
- To sensitize students to social ethics by applying ethical reasoning to issues such as gender bias, violence, social discrimination, and inclusive practices.
- To impart an understanding of scientific ethics by emphasizing transparency, fairness, and the social responsibility of scientists in the application of scientific inventions.

UNIT I DEMOCRATIC VALUES

9

Understanding Democratic values: Equality, Liberty, Fraternity, Freedom, Justice, Pluralism, Tolerance, Respect for All, Freedom of Expression, Citizen Participation in Governance – World Democracies: French Revolution, American Independence, Indian Freedom Movement.

UNIT II SECULAR VALUES

9

Understanding Secular values – Interpretation of secularism in Indian context - Disassociation of state from religion – Acceptance of all faiths – Encouraging non-discriminatory practices. Reading Text: Excerpt from Secularism in India: Concept and Practice by Ram Puniyani.

UNIT III SCIENTIFIC VALUES

9

Scientific thinking and method: Inductive and Deductive thinking, Proposing and testing Hypothesis, Validating facts using evidence based approach – Skepticism and Empiricism – Rationalism and Scientific Temper.

UNIT IV SOCIAL ETHICS

9

Application of ethical reasoning to social problems – Gender bias and issues – Gender violence – Social discrimination – Constitutional protection and policies – Inclusive practices.

UNIT V SCIENTIFIC ETHICS

9

Transparency and Fairness in scientific pursuits – Scientific inventions for the betterment of society - Unfair application of scientific inventions – Role and Responsibility of Scientist in the modern society.

TOTAL:45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Explain fundamental democratic values and analyze their application in the French Revolution, American Independence, and Indian Freedom Movement.
- Explain secularism in India and demonstrate an understanding of religious neutrality, acceptance of all faiths, and non-discriminatory practices.
- Apply scientific methods and evidence-based reasoning to analyze problems, validate facts, and demonstrate scientific temper.
- Analyze social problems using ethical frameworks and identify constitutional protections and policies that promote equity and inclusion.
- Evaluate ethical issues in scientific practices and demonstrate responsible decision-making for the societal use of scientific advancements.

TEXT BOOKS

1. Luke W. Galen, "The Nonreligious: Understanding Secular People and Societies", Oxford University Press, 2016.
2. Bullivant, Stephen; Lee Lois, "Secularism: A Dictionary of Atheism", Oxford University Press, 2016.

REFERENCES

1. John R. Shook, "The Oxford Handbook of Secularism", Oxford University Press, 2017.
2. Gabriel A. Almond and Sidney Verba, "The Civic Culture: Political Attitudes and Democracy in Five Nations", Princeton University Press, 2016.
3. Dr.E.Gnanasekaran, "Human values and ethics", Lakshmi Publication, 2021

E-RESOURCES

1. <https://nptel.ac.in/courses/109104068> (Exploring Human Values)
2. <https://nptel.ac.in/courses/109106117> (Ethical Theory)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	-	-	-	-	-	3	3	-	2	-	2	1	1
2	-	-	-	-	-	3	3	-	2	-	2	1	1
3	2	3	-	3	-	-	-	-	-	-	2	1	1
4	-	2	-	-	-	3	3	1	1	-	1	1	1
5	-	2	-	-	-	3	3	1	1	-	1	1	1
AVG.	2	2.3	-	3	-	3	3	1	1.5	-	1.6	1	1

1-Low 2-Medium 3-High '-' – No Correlation

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23EEJ701

PROJECT WORK - PHASE - II

L T P C
0 0 8 4

OBJECTIVES

- To develop knowledge to formulate a real world problem and projects goals.
- To identify the various tasks of the project to determine standard procedures.
- To identify and learn new tools, algorithms and techniques.
- To understand the various procedures for validation of the product and analysis the cost effectiveness.
- To understand the guideline to Prepare report for oral demonstrations.

PROCESS DESCRIPTION

- Continuation of Project Work – Phase I.
- For Project work out of 100 marks, the maximum marks for Continuous Internal Assessment is fixed as 60 and the End Semester Examination (project report evaluation and viva voce examination) carries 40 marks.
- The total credit for project work in semester VII is 4.
- There shall be two reviews (Review I and Review II, each 100 marks) during the semester by a review committee. The student shall make presentation on the progress made before the committee. The Head of the Department shall constitute a review committee for each programme. There shall be a minimum of three members in the review committee.
- The committee shall consist of the Supervisor, Project Coordinator and one of the faculty members.
- The student is expected to submit the project report on or before the last working day of the semester. The project report shall be submitted as per the approved guidelines given by Controller of Examinations. The COE shall appoint an External Examiner for the ESE of the Project Work. The ESE for the project work shall be evaluated by both the external examiner and an internal examiner. The project coordinator shall be the internal examiner.





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OUTCOMES

Upon completion of the course, the students will be able to:

- Formulate real-world problems.
- Design and express technical solutions using appropriate tools and techniques.
- Test and validate prototypes for efficiency and cost-effectiveness, and present their work effectively through reports and oral demonstrations.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
Mapping outcome	3	3	3	3	3	3	3	3	3	3	3	3	3

1-Low, 2-Medium, 3-High, “-” - No Correlation


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SEMESTER VIII

23EEJ801

PRODUCT DEVELOPMENT

L T P C
0 0 12 6

OBJECTIVES

- To convert the completed project into a functional product or working prototype.
- To improve the product by incorporating necessary modifications.
- To prepare the required technical documents for the developed product.
- To understand the basic aspects of product quality, usability and maintenance.
- To develop professional skills through product demonstration and presentation.

COURSE DESCRIPTION

This course is to develop a product to meet the real time needs and suitable to market delivery. The product development is desirable to be the continuation of the Capstone Project completed in Project Work – Phase II. Students shall enhance the completed project into a functional product or working prototype by improving its design, performance and usability wherever applicable. The course emphasizes testing, refinement, documentation and presentation of the developed product. Students are encouraged to demonstrate the final outcome before the evaluation committee.

PROCESS DESCRIPTION

- The Product Development course shall be based on the Capstone Project completed during Project Work – Phase II.
- Students shall improve the completed project by incorporating suitable modifications and documentation to develop a functional product or working prototype, wherever applicable.
- The work may be carried out individually or in groups not exceeding four students.
- The total credits for Product Development in Semester VIII shall be 6.
- For Product Development, the maximum marks shall be 100, of which Continuous Internal
- Assessment (CIA) carries 60 marks and the End Semester Examination (ESE) carries 40 marks.
- There shall be three reviews during the semester by a Review Committee duly constituted by the Head of the Department.
- The Review Committee shall consist of:
 - Supervisor
 - Product Development Coordinator
 - One Senior faculty member

Review I

- Progress of product development
- Design improvements
- Implementation status





Review II

- Performance improvements
- Action taken on previous review suggestions.
- Documentation progress

Review III

- Final product or prototype demonstration
- Technical documentation
- Presentation
- Students shall submit a Product Development Report as per the guidelines prescribed by the Controller of Examinations.
- The End Semester Examination shall consist of product/prototype demonstration, report evaluation and viva-voce examination.
- The End Semester Examination shall be jointly evaluated by both an External Examiner and an Internal Examiner.

OUTCOMES

Upon completion of the course, the students will be able to:

- Develop a functional product or working prototype based on the completed project.
- Improve the product to meet the intended requirements.
- Prepare technical documentation for the developed product.
- Explain the basic aspects of product quality, maintenance and future improvements.
- Demonstrate the developed product effectively through presentation and viva-voce.

Assessment Scheme

- For Product Development, out of 100 marks, the maximum marks for Continuous Internal Assessment (CIA) is fixed as 60 and the End Semester Examination (ESE) carries 40 marks.
- Continuous Assessment shall be based on the progress of product development, technical contribution, documentation and presentations made during the three reviews conducted by the Review Committee constituted by the Head of the Department.
- The End Semester Examination shall consist of the evaluation of the Product Development Report, demonstration of the developed product/prototype or the work completed, and Viva-Voce Examination.
- The evaluation shall focus on the student's critical thinking, skills and understanding of the work carried out, technical knowledge, documentation, presentation and overall contribution.
- The End Semester Examination shall be jointly evaluated by an External Examiner appointed by the Controller of Examinations and an Internal Examiner nominated by the Head of the Department.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
Mapping outcome	3	3	3	3	3	3	3	3	3	3	3	3	3

1-Low, 2-Medium, 3-High, "-" - No Correlation

Chairman - BOS





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23EEEC801

INTERNSHIP

L T P C
0 0 4 2

Students shall undergo internship of 4 weeks with 2 credits during 8th semester curriculum for all B.E. / B.Tech Programmes. The industry / organization is to be selected with the approval of Head of the Department. One faculty member approved by the Head of the department shall be responsible for the periodic monitoring and evaluation of the students' progress in the course.

Duration of Industrial Training	Credits
2 Weeks	1
4 Weeks	2

*1 week of Industrial Training = 40 hours.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
Mapping outcome	3	3	3	3	3	3	3	3	3	3	3	3	3

1-Low, 2-Medium, 3-High, "-" - No Correlation

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PROFESSIONAL ELECTIVE I

23CEP501

TOTAL STATION AND GPS SURVEYING

L T P C

3 0 0 3

OBJECTIVES

- To acquire knowledge on fundamentals and applications of total station.
- To familiarize with the application of electro-optical and microwave.
- To develop proficiency in the satellite system and applications.
- To enhance the ability in GPS data processing.
- To impart essential knowledge on the surveying methods and applications.

UNIT I FUNDAMENTALS OF TOTAL STATION AND ELECTROMAGNETIC WAVES 9

Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying - Applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies – Refractive index (RI) – factors affecting RI -Computation of group for light and near infrared waves at standard and ambient conditions – Computation of RI for microwaves at ambient condition – Reference refractive index -Real-time application of first velocity correction. Measurement of atmospheric parameters - Mean refractive index – Second velocity correction - Total atmospheric correction - Use of temperature -pressure, transducers.

UNIT II ELECTRO-OPTICAL AND MICROWAVE 9

Electro - optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave Total Station instruments. Comparison between Electro-optical and Microwave system. Care and maintenance of Total Station instruments. COGO functions: Area, Inverse / MLM, REM, Resection, offsets and stakeout - Land survey applications.

UNIT III SATELLITE SYSTEM 9

Basic concepts of GPS – Historical perspective and development – applications -Geoid and Ellipsoid – satellite orbital motion – Keplerian motion – Kepler's Law – Perturbing forces - Geodetic satellite – Doppler effect – Positioning concept – GNSS and IRNSS – SBAS: GAGAN and WAAS Different segments - space, control and user segments – satellite configuration – GPS signal structure – Orbit determination and representation – Anti Spoofing and Selective Availability -Task of control segment – GPS receivers.

UNIT IV GPS DATA PROCESSING 9

GPS observables – code and carrier phase observation – linear combination and derived observables – concept of parameter estimation – downloading the data – RINEX Format–Differential data processing – software modules - solutions of cycle slips, ambiguities - Multi path and other observational errors – satellite geometry and accuracy measures – Continuously Operating Reference System (CORS)– long base line processing - use of different processing software's: Open Source, Scientific and Commercial.





UNIT V SURVEYING METHODS AND APPLICATIONS

9

Total Station: Traversing and Trilateration measurement and adjustment –Planimetric map and Contour map and Topography Mapping. GNSS: Concepts of rapid, static, semi-Kinematic, pure Kinematic and RTK methods. Observation by Radiation, Lee frog and Trilateration measurement and processing -Topography mapping using PPK and RTK methods. Total Station and GNSS applications.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Construct the fundamental concept of Total station.
- Examine the electromagnetic waves and its usage in Total station and GNSS.
- Apply the basic concepts of GNSS.
- Analyze the measuring and working principle of electro optical and Microwave Total station and GPS.
- Identify the Total station and GNSS data processing and Mapping.

TEXT BOOKS

1. Rueger, J.M. "Electronic Distance Measurement", Springer-Verlag, Berlin, Fourth Edition, 2020
2. Satheesh Gopi, Ra Sathishkumar, N.Madhu, "Advanced Surveying -Total Station GPS and Remote Sensing", Pearson education, Second Edition, 2021.
3. Gunter Seeber, "Satellite Imaging", Walter De Gruyter, Berlin, Second Edition, 2019.

REFERENCES

1. R.Subramanian, "Surveying and Levelling", Oxford University Press, Second Edition, 2019.
2. Laurila, S.H. "Electronic Surveying in Practice", John Wiley and Sons Inc, Fifth Edition, 2020
3. Guocheng Xu, "GPS Theory, Algorithms and Applications", Springer - Verlag, Berlin, Third Edition, 2019.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc22_ce05/preview (Digital Land Surveying and Mapping)
2. <https://archive.nptel.ac.in/courses/105/107/105107157/> (GPS Surveying)





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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	3	2	3	3	-	-	1	-	-	3	3
2	3	2	3	2	3	3	-	-	1	-	-	3	3
3	3	2	3	2	3	3	-	-	1	-	-	3	3
4	3	2	3	2	3	3	-	-	1	-	-	3	3
5	3	2	3	2	3	3	-	-	1	-	-	3	3
AVG.	3	2	3	2	3	3	-	-	1	-	-	3	3

1-Low 2-Medium 3-High '-' – No Correlation


Chairman - BoS





23CEP502

REMOTE SENSING CONCEPTS

L T P C
3 0 0 3

OBJECTIVES

- To inculcate the concepts of remote sensing processes.
- To impart knowledge on applications of standard atmospheric profile and earth material.
- To familiarize with the orbits and platforms.
- To instruct the various remote sensing techniques
- To enhance the elements of data interpretation.

UNIT I REMOTE SENSING AND ELECTROMAGNETIC RADIATION

9

Definition – components of RS – History of Remote Sensing – Merits and demerits of data collation between conventional and remote sensing methods - Electromagnetic Spectrum – Radiation principles - Wave theory, Planck's law, Wien's Displacement Law, Stefan's Boltzmann law, Kirchoff's law – Radiation sources: active & passive - Radiation Quantities.

UNIT II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIAL

9

Standard atmospheric profile – main atmospheric regions and its characteristics – interaction of radiation with atmosphere – Scattering, absorption and refraction – Atmospheric windows - Energy balance equation – Specular and diffuse reflectors – Spectral reflectance & emittance – Spectroradiometer – Spectral Signature concepts – Typical spectral reflectance curves for vegetation, soil and water – solid surface scattering in microwave region.

UNIT III ORBITS AND PLATFORMS

9

Motions of planets and satellites – Newton's law of gravitation - Gravitational field and potential - Escape velocity - Kepler's law of planetary motion - Orbit elements and types – Orbital perturbations and maneuvers – Types of remote sensing platforms - Ground based, Airborne platforms and Space borne platforms – Classification of satellites – Sun synchronous and Geosynchronous satellites – Legrange Orbit.

UNIT IV SENSING TECHNIQUES

9

Classification of remote sensors – Resolution concept: spatial, spectral, radiometric and temporal resolutions - Scanners - Along and across track scanners – Optical-infrared sensors – Thermal sensors –microwave sensors – Calibration of sensors - High Resolution Sensors - LIDAR , UAV – Orbital and sensor characteristics of live Indian earth observation satellites.

UNIT V DATA PRODUCTS AND INTERPRETATION

9

Photographic and digital products – Types, levels and open-source satellite data products – selection and procurement of data– Visual interpretation: basic elements and interpretation keys -Digital interpretation – Concepts of Image rectification, Image enhancement and Image classification.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to

- Identify the concepts and laws related to remote sensing.
- Analyze the interaction of electromagnetic radiation with atmosphere and earth material.
- Explain about satellite orbits and different types of satellites.
- Classify the different types of remote sensors.
- Construct the knowledge about the concepts of interpretation of satellite imagery.

TEXT BOOKS

1. Thomas M. Lillesand, Ralph W. Kiefer and Jonathan W. Chipman, "Remote Sensing and Image Interpretation", John Wiley and Sons, Ninth Edition, 2019.
2. George Joseph and C Jeganathan, "Fundamentals of Remote Sensing", Universities Press (India) Private limited, Third Edition, 2020.
3. Janza, F.Z., Blue H.M. and Johnson, J.E. "Manual of Remote Sensing. Vol. I", American Society of Photogrammetry, Virginia, Fifth Edition, 2021.

REFERENCES

1. Verbyla, David, "Satellite Remote Sensing of Natural Resources", CRC Press, Third Edition, 2019
2. Paul Curran P.J. "Principles of Remote Sensing. Longman", RLBS, Eighth Edition, 2022.
3. Charles Elachi and Jacob Van Zyl, "Introduction to Physics and Techniques of Remote Sensing", Wiley Publication, Second Edition, 2020.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc22_ce84/preview (Remote Sensing and GIS)
2. https://onlinecourses.nptel.ac.in/noc20_ce29/preview (Remote Sensing Essentials)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	-	-	-	-	-	-	-	-	-	-	3	-
2	3	-	-	-	-	-	-	-	-	-	-	3	-
3	2	-	-	-	-	-	-	-	3	3	-	3	-
4	3	3	2	3	3	-	3	3	-	-	1	3	3
5	3	3	2	3	3	3	3	-	3	3	1	3	3
AVG.	3	3	2	3	3	3	3	3	3	3	1	3	3

1-Low 2-Medium 3-High '-' – No Correlation

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23CEP503

SATELLITE IMAGE PROCESSING

L T P C

3 0 0 3

OBJECTIVES

- To explore the fundamentals of image processing.
- To enhance the sensors model and its processing.
- To develop the image enhancement in satellite image processing.
- To inculcate the image classification in processing.
- To instruct the advance classifiers in image processing.

UNIT I FUNDAMENTALS OF IMAGE PROCESSING

9

Information Systems - Encoding and decoding - acquisition, storage and retrieval - data products - satellite data formats - Digital Image Processing Systems - Hardware and software design consideration Scanner, digitizer - photo write systems.

UNIT II SENSORS MODEL AND PRE-PROCESSING

9

Image Fundamentals - Sensor models - spectral response - Spatial response - IFOV, GIFOV & GSI - Simplified Sensor Models - Sampling & quantization concepts - Image Representation & geometry and Radiometry - Colour concepts - Sources of Image degradation and Correction procedures- Atmospheric, Radiometric, Geometric Corrections- Image Geometry Restoration- Interpolation methods and resampling techniques.

UNIT III IMAGE ENHANCEMENT

9

Image Characteristics - Histograms - Scattergrams - Univariate and multi variate statistics- enhancement in spatial domain - global, local & colour Transformations - PC analysis, edge detections, merging - filters - convolution - LPF, HPF, HBF, directional box, cascade - Morphological and adaptive filters - Zero crossing filters - scale space transforms - power spectrum - texture analysis - frequency transformations - Fourier, wavelet and curvelet transformations.

UNIT IV IMAGE CLASSIFICATION

9

Spectral discrimination - pattern recognition concepts - Baye's approach - Signature and training sets - Separability test -Supervised Classification - Minimum distance to mean, Parallelepiped, MLC - Unsupervised classifiers - ISODATA, K-means-Support Vector Machine - Segmentation (Spatial, Spectral) - Tree classifiers - Accuracy assessment - Error matrix - Kappa statistics - ERGAS, RMS.

UNIT V ADVANCED CLASSIFIERS

9

Fuzzy set classification - sub- pixel classifier - hybrid classifiers, Texture based classification - Object based classifiers - Artificial Neural nets - Hebbian leaning - Expert system, types and examples - Knowledge systems.

TOTAL: 45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Examine the remote sensing and image processing systems.
- Analyze the source of error in satellite image and also to remove the error from satellite image.
- Identify the appropriate image Enhancement techniques based on image characteristics.
- Classify the satellite image using various method and also evaluate the accuracy of classification.
- Apply the advanced image classification methods and conduct lifelong research in the field of image processing.

TEXT BOOKS

1. John, R. Jensen. "Introductory Digital Image Processing", Prentice Hall, New Jersey, Fourth Edition, 2022.
2. Robert, A. Schowengerdt, "Techniques for Image Processing and classification in Remote Sensing", Academic Press, Ninth Edition, 2020.
3. Richards, "Remote sensing digital Image Analysis - An Introduction", Fifth Edition, 2019.

REFERENCES

1. Rafael C. Gonzalez, "Digital Image Processing", Richard Eugene Woods-Pearson/Prentice Hall, Eighth Edition, 2019.
2. Pearson P, "Fundamentals of Digital Image Processing", Annadurai Pearson Education, Ninth Edition, 2020
3. William K. Pratt, "Digital Image Processing: PIKS Scientific Inside", Wiley Interscience, Fourth Edition, 2021.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc19_ce38/preview (Remote Sensing and Digital Image Processing of Satellite Data)
2. https://onlinecourses.nptel.ac.in/noc23_ce94/preview (Global Navigation Satellite Systems and Applications)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	-	-	-	3	-	-	-	-	-	-	3	3
2	3	3	-	-	3	-	-	-	-	-	-	3	3
3	3	3	-	-	3	-	2	2	2	2	3	3	3
4	3	3	3	3	3	-	2	2	2	2	3	3	3
5	3	3	3	3	3	3	2	2	-	2	3	3	3
AVG.	3	3	3	3	3	3	2	2	2	2	3	3	3

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS





23CEP504

CARTOGRAPHY AND GIS

L T P C

3 0 0 3

OBJECTIVES

- To gain knowledge on the elements of cartography.
- To instruct the process of map design.
- To impart knowledge on the fundamentals of GIS.
- To familiarize with the data input and topology.
- To explore the data quality and data output in presentation.

UNIT I ELEMENTS OF CARTOGRAPHY

9

Definition of Cartography – Maps – Functions – Uses and Types of Maps – Map Scales and Contents – Map Projections – Shape, Distance, Area and Direction Properties – Perspective and mathematical Projections – Indian Maps and Projections – Map Co-ordinate System – UTM and UPS References.

UNIT II MAP DESIGN AND PRODUCTION

9

Elements of a Map – Map Layout Principles – Map Design Fundamentals – Symbols and Conventional Signs – Graded and Ungraded Symbols – Color Theory – Colours and Patterns in Symbolization – Map Lettering – Map Production – Map Printing – Colours and Visualization – Map Reproduction – Map Generalization – Geometric Transformations – Bilinear and Affine Transformations.

UNIT III FUNDAMENTALS OF GIS

9

Introduction to GIS – Definitions – History of GIS – Components of a GIS – Hardware, Software, Data, People, Methods – Introduction to data quality – Types of data – Spatial, Attribute data – types of attributes – scales/levels of measurements – spatial data models – Raster Data Structures – Raster Data Compression – Vector Data Structures – Raster Vs Vector Models – TIN and GRID data models.

UNIT IV DATA INPUT AND TOPOLOGY

9

Scanner – Raster Data Input – Raster Data File Formats – Georeferencing – Vector Data Input – Digitizer – Datum Projection and Reprojection – Coordinate Transformation – Topology – Adjacency, Connectivity and containment – Topological Consistency – Non topological file formats – Attribute Data Linking – Linking External Databases – GPS Data Integration – Raster to Vector and Vector to Raster Conversion.

UNIT V DATA QUALITY AND OUTPUT

9

Assessment of Data Quality - Basic Aspects - Completeness, Logical Consistency, Positional Accuracy, Temporal Accuracy, Thematic Accuracy and Lineage – Metadata – GIS Standards – Interoperability – OGC - Spatial Data Infrastructure – Data Output – Map Compilation – Chart / Graphs.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the appropriate map projection and co-ordinate system for production of Maps and shall able to compile and design maps for their required purpose.
- Examine the co-ordinate and Datum transformations.
- Construct the basic concepts and components of GIS, the techniques used for storage of spatial data and data compression.
- Develop the concepts of spatial data quality and data standard.
- Apply the concept of spatial data inputs.

TEXT BOOKS

- Arthur H. Robinson et al, "Elements of Cartography", Wiley, Seventh Edition, 2019.
- Kang – Tsung Chang, "Introduction to Geographic Information Systems", McGraw Hill Publishing, Fourth Edition, 2020.
- Ian Heywood, Sarah Cornelius, Steve Carver, Srinivasa Raju, "An Introduction to Geographical Information Systems", Pearson Education, Fourth Edition, 2021.

REFERENCES

- John Campbell, "Introductory Cartography", Wm. C.Brown Publishers, Third Edition, 2021.
- Chor Pang LO, Albert K. W. Yeung, "Concepts and Techniques of Geographic Information Systems", Pearson Education, Second Edition, 2016.
- Richards, "Remote sensing digital Image Analysis - An Introduction", Fifth Edition, 2019.

E-RESOURCES

- https://onlinecourses.nptel.ac.in/noc21_ce09/preview (Geographic Information Systems)
- https://onlinecourses.nptel.ac.in/noc22_ce78/preview(Advanced Geomatics Engineering)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	1	2	1	1	1	-	-	-	-	-	3	2
2	3	2	1	1	1	1	-	-	-	-	-	3	2
3	3	1	1	1	3	1	-	-	-	-	-	3	2
4	3	1	2	1	2	1	-	-	-	-	-	3	2
5	3	2	2	1	2	2	-	-	-	-	-	3	3
AVG.	3	1.4	1.6	1	1.8	1.2	-	-	-	-	-	3	2.2

1-Low 2-Medium 3-High '-' – No Correlation

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23CEP505

PHOTOGRAMMETRY

L T P C

3 0 0 3

OBJECTIVES

- To acquire knowledge on the basics of photogrammetry.
- To interpret the properties of aerial photographs.
- To explore the fundamentals of plotters and its orientation.
- To inculcate the process of aerial photogrammetry.
- To impart knowledge on the process of digital photogrammetry.

UNIT I PRINCIPLES AND PROPERTIES OF PHOTOGRAPHY

9

History - Definition, Applications – Types of Photographs, Classification – Photographic overlaps – Camera: metric vs. non-metric, Digital Aerial cameras – Multiple frame and Line cameras – Linear array scanner – Flight Planning – Crab & Drift– Computation of flight plan - Photogrammetry project Planning.

UNIT II GEOMETRIC PROPERTIES OF AERIAL PHOTOGRAPHS

9

Photo coordinate measurement – Vertical photographs -geometry, scale, Coordinate system, Relief displacement – Stereoscopes – Stereoscopic parallax – parallax equations -Geometry, Scale, Coordinate system – Relief displacement – Photo Interpretation.

UNIT III STEREOPLOTTERS AND ORIENTATION

9

Projection system, Viewing, Measuring and Tracing system Stereo plotters–Classification: Analog, semi analytical, Analytical and Digital systems – Interior orientation - Relative orientation – Absolute orientation - Collinearity condition and Coplanarity condition - Orientation: Two-dimensional coordinate transformations –Three-dimensional conformal coordinate transformation.

UNIT IV AERO-TRIANGULATION, TERRAIN MODELING AND ORTHOPHOTO

9

Model – Strip and blocks of photographs – Aero-triangulation: strip adjustment, independent model triangulation, Bundle block Adjustment and GPS Aero-triangulation (INS and GNSS integration) - feature collection – DTM generation and Contour mapping – ortho rectification - mono plotting – stereo plotting.

UNIT V DIGITAL PHOTOGRAMMETRY

9

Photogrammetric Scanner – Digital Photogrammetry WorkStation – Work Station Basic system function – Storage System – Stereoscopic Viewing and Measuring System – Image properties - Image matching: template matching, feature based matching - DEM and DSM - Satellite photogrammetry principles.

TOTAL: 45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Construct the principles and properties of photography.
- Develop the photo coordinate measurement and photo interpretation.
- Evaluate the two-dimensional and three-dimensional coordinate transformations.
- Examine the DTM generation and contour mapping.
- Analyze the digital photogrammetric workstation and its functions.

TEXT BOOKS

1. Paul. R Wolf., Bon A. De Witt, "Elements of Photogrammetry with Application in GIS", McGraw Hill International Book Co., Fourth Edition, 2019.
2. E. M. Mikhail, J. S. Bethel, J. C. McGlone, "Introduction to Modern Photogrammetry", Wiley Publisher, 2021.
3. Gollfried Konecny, "Geoinformation: Remote Sensing, Photogrammetry and Geographical Information Systems", CRC Press, Second Edition, 2019.

REFERENCES

1. Karl Kraus, "Photogrammetry: Geometry from Images and Laser Scans", Walter deGruyter GmbH & Co. Second Edition, 2021.
2. Wilfried Linder "Digital Photogrammetry – A practical course", Third Edition, 2019.
3. Y. Egels, Michel Kasser, "Digital Photogrammetry", Taylor & Francis group, Seventeenth Edition, 2020.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc20_ce16/preview (Higher Surveying)
2. https://onlinecourses.nptel.ac.in/noc22_ce37/preview (Surface Water Hydrology)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	1	2	2	2	2	1	-	-	-	-	3	2
2	3	3	3	3	2	3	1	-	-	-	-	3	2
3	3	2	3	2	2	2	2	-	-	-	-	3	2
4	3	3	2	3	3	3	3	-	-	-	-	3	2
5	3	3	3	3	3	3	3	-	-	-	-	3	2
AVG.	3	2.4	2.6	2.6	2.4	2.6	2	-	-	-	-	3	2

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS





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23CEP506

HYDROGRAPHIC SURVEYING

L T P C

3 0 0 3

OBJECTIVES

- To instruct the necessary knowledge about tides and datums.
- To inculcate the instrument operational of soundings.
- To impart knowledge on the fundamentals of navigations in hydrographic surveying.
- To familiarize with the data processing skills.
- To explore the process of environmental measurements in marine.

UNIT I INTRODUCTION, TIDES AND DATUMS

9

Overview of hydrographic surveying concepts- bathymetric and nautical charts- Basic tidal theory-tidal observations and predictions - common types of recording tide gauges - different vertical datums - Indian tides.

UNIT II SOUNDINGS

9

Overview of depth data types- Working principle of echo sounders - characteristics and nature of underwater acoustic signals – transducers - error sources and calibrations- Advanced instrumentation.

UNIT III NAVIGATION AND POSITION FIXING

9

Horizontal positioning methods and requirements - concept of line and surface of position - positioning and navigation using satellite positioning systems - differential GPS and Real-time kinematic (RTK).

UNIT IV PLANNING AND DATA PROCESSING

9

General considerations for planning of an inshore hydrographic survey - ground and track control - practical soundings in inshore and coastal surveys - data processing and chart compilation - hydrographic software packages for data collection - processing and plotting.

UNIT V MARINE ENVIRONMENTAL MEASUREMENTS

9

Methods of measuring and recording of currents - composition of the sea bed - and solids in suspension - Case Studies (The role of the hydrographic surveyor on different marine projects).

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the fundamentals of hydrographic surveying.
- Identify the appropriate techniques for different types of survey.
- Examine the various options available during the Navigation.
- Analyze the data collected from a survey and assess its quality against the project requirements.
- Classify the different roles for a hydrographic surveyor on marine projects.





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TEXT BOOKS

1. U.S. Army Corps of Engineers, "Hydrographic Surveying", Document No. EM 1110-2-1003, Sixth Edition, 2020.
2. De Jong, C. D., Lachapelle, G., Skone, S. & Elema, I. A., "Hydrography", Delft University Press, Eleventh Edition, 2019.
3. Ingham, A. E., "Hydrography for the Surveyor and Engineer", Blackwell Science, Third Edition, 2020.

REFERENCES

1. Loweth, R. P., "Manual of Offshore Surveying for Geoscientists and Engineers", Chapman & Hall, Seventh Edition, 2022.
2. Pugh, D., "Changing Sea Levels – Effects of Tides, Weather and Climate", Cambridge University Press, Third Edition, 2020.
3. Sonnenberg, G. J., "Radar and Electronic Navigation", Butterworths, Eighth Edition, 2019.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_ce09/preview (Geographic Information Systems)
2. https://onlinecourses.nptel.ac.in/noc22_ce78/preview (Advanced Geomatics Engineering)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	-	-	-	-	-	-	-	-	-	-	3	2
2	3	-	-	-	-	-	-	3	-	-	-	3	3
3	3	2	3	3	3	-	3	3	-	-	-	3	3
4	3	3	3	3	3	3	3	3	-	3	3	3	3
5	3	2	3	3	3	3	3	3	3	3	3	3	3
AVG.	3	2.3	3	3	3	3	3	3	3	2	2	3	2.8

1-Low 2-Medium 3-High '-' – No Correlation


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PROFESSIONAL ELECTIVE II

23CEP507

ADVANCED STRUCTURAL ANALYSIS

L T P C

3 0 0 3

OBJECTIVES

- To familiarize with analysis of beams and frames using direct flexibility method.
- To inculcate the understand concepts of matrix stiffness method.
- To enhance the fundamentals of influence line concepts for moving loads.
- To enable the analysis of space trusses using method of tension coefficients.
- To foster the plastic analysis of structures.

UNIT I FLEXIBILITY METHOD

9

Primary structures – Compatibility conditions – Formation flexibility matrices – Analysis of indeterminate pin- jointed plane frames, continuous beams and rigid jointed plane frames by direct flexibility approach.

UNIT II STIFFNESS METHOD

9

Restrained structure – Formation of stiffness matrices – equilibrium condition – Analysis of Continuous Beams – Pin-jointed plane frames and rigid frames by direct stiffness method.

UNIT III INFLUENCE LINES FOR INDETERMINATE BEAMS

9

Muller Breslau's principle - Influence line for support reactions, shearing force and bending moments for indeterminate beams - propped cantilevers, fixed beams and continuous beams.

UNIT IV SUSPENSION BRIDGES AND SPACE TRUSSES

9

Analysis of suspension bridges – Unstiffened cables and cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders - Introduction to analysis of space trusses using method of tension coefficients.

UNIT V PLASTIC ANALYSIS OF STRUCTURES

9

Plastic moment of resistance – shape factor – Load factor – plastic hinge and mechanism – plastic analysis of Indeterminate beams and frames (Single bay and single storey) – Applications of upper and lower bound theorems.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the indeterminate pin jointed plane frames, continuous beams and rigid frames using direct flexibility method.
- Examine the direct stiffness method in analysis of continuous beams, pin jointed trusses and rigid plane frames.
- Analyze the Muller Breslau's principle for drawing Influence line diagram for indeterminate structures.
- Identify the suspension bridges and space trusses.
- Analyze the indeterminate beams and frames by using plastic theory.

TEXTBOOKS

1. Bhavikatti S.S, "Structural Analysis – Vol.I& II", Vikas Publishing Private Limited, Second Edition, 2019
2. Menon D, "Structural Analysis", Alpha Science International Limited, Ninth Edition, 2020.
3. Punmia B.C, Ashok Kumar J, "Theory of Structures", Laxmi Publications, Third Edition, 2021.

REFERENCES

1. Wang, C.K, "Analysis of Indeterminate Structures", Tata McGraw-Hill Publishing Company, Sixth Edition, 2019.
2. Pandit.G.S, "Theory of Structures, Vol-I", McGraw Hill Education Private Limited, Fifth Edition, 2017.
3. Reddy.C.S, "Basic Structural Analysis", Tata Mc Graw Hill Publishing Company", Seventh Edition, 2020.

E-RESOURCES

1. [https://archive.nptel.ac.in/courses/105/105/105105166/#\(Structural Analysis - I\)](https://archive.nptel.ac.in/courses/105/105/105105166/#(Structural%20Analysis%20-%20I))
2. [https://archive.nptel.ac.in/courses/105/105/105105109/\(Structural Analysis - II\)](https://archive.nptel.ac.in/courses/105/105/105105109/(Structural%20Analysis%20-%20II))

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	3	-	2	-	1	2	2	1	3	2
2	3	3	3	3	-	2	-	1	2	2	1	3	2
3	3	3	3	3	-	2	-	1	2	2	1	3	2
4	3	3	3	3	-	2	-	1	2	2	1	3	2
5	3	2	3	1	-	2	-	1	2	2	1	3	2
AVG.	3	2.8	3	2.6	-	2	-	1	2	2	1	3	2

1-Low 2-Medium 3-High '-' – No Correlation

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TIRUCHENGODE- 637 205



23CEP508 DYNAMICS AND EARTHQUAKE RESISTANT STRUCTURES

L T P C

3 0 0 3

OBJECTIVES

- To explore the principles and methods of dynamic analysis.
- To inculcate the earthquake monitoring with seismic instrumentation.
- To enable the effects of earthquake on structures.
- To familiarize the various methods of earthquake load analysis.
- To instruct the design of earthquake resistant buildings.

UNIT I INTRODUCTION TO DYNAMICS

9

Dynamics - Degree of freedom - Free and forced vibration - Idealization of structure as Single Degree of Freedom (SDOF) and Multi degree of freedom (MDOF) system - D'Alemberts Principles - Formulation of equation of motion for SDOF system and MDOF system - Evaluation of natural frequencies and modes - Effect of damping.

UNIT II SEISMOLOGY

9

Elements of Engineering Seismology - Seismic hazard - Earthquake phenomenon - Seismotectonics - Seismic Instrumentation - Characteristics of Strong Earthquake motion - Estimation of Earthquake Parameters - Soil Structure Interaction - Liquefaction of soil - Seismic zone map - Response spectra.

UNIT III EARTHQUAKE EFFECTS ON STRUCTURES

9

Inertia force on structures - load transfer path - Effect of architectural features on behavior of structures - Hysteretic Behaviour of RCC, steel and pre-stressed concrete - Pinching Effect - Bouchinger Effects - Energy dissipation - P-delta effect - storey drift - Behavior of brick masonry, stone masonry and reinforced concrete structures under past earthquakes - typical failures - Causes of damage - Lessons learnt from past earthquakes.

UNIT IV EARTHQUAKE LOAD ANALYSIS

9

Design spectra - Codal provision - Different methods of earthquake analysis - Analysis of structure by Equivalent static method - Analysis of structure by Response spectrum method - Introduction to time-history method of analysis.

UNIT V EARTHQUAKE RESISTANT DESIGN

9

Philosophy of earthquake resistant design - Planning considerations and Architectural concepts - Design and detailing as per codal provisions - Design and detailing of typical flexural member and column member, Ductile detailing of beam-column joints and footing - concept and principle of shear wall - Introduction to performance based seismic design - Seismic isolation principles and methods.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the equations of motion for SDOF and MDOF system.
- Examine the elements of engineering seismology, characteristics of earthquake and seismic instrumentation.
- Classify the various types of structures under earthquake.
- Analyze the forces in a structure due to earthquake.
- Construct the earthquake resistant building structures.

TEXT BOOKS

1. Anil K. Chopra, "Dynamics of Structures", Pearson Education, Third Edition, 2020.
2. S K Duggal, "Earthquake Resistant Design of Structures", Oxford University Press, Third Edition, 2019.
3. Sukhvarsh Jerath, "Structural Stability Theory and Practice", Wiley Publishers, First Edition, 2021.

REFERENCES

1. Martin Williams, "Structural Dynamics", CRC Press, First Edition, 2019.
2. H. R. Wason, M. L. Sharma, Manish Shrikhande. "Advances in Indian Earthquake Engineering and Seismology", Springer, First Edition, 2020.
3. Sekhar Chandra Dutta, Parthasarathi Mukhopadhyay, "Improving Earthquake and Cyclone Resistance of Structures", Energy and Resources Institute, Second Edition, 2019.

E-RESOURCES

1. <https://nptel.ac.in/courses/105/106/105106151/> (Structural Dynamics)
2. <https://nptel.ac.in/courses/105/102/105102016/> (Seismic Analysis of Structures)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	2	-	1	-	1	1	1	1	3	2
2	3	2	2	2	-	1	-	1	1	1	1	3	2
3	3	3	3	3	-	3	-	2	1	1	1	3	2
4	3	3	3	2	-	2	-	3	1	1	1	3	3
5	3	3	3	3	-	3	-	3	1	1	1	3	2
AVG.	3	2.8	2.8	2.4	-	2	-	2	1	1	1	3	2.2

1-Low 2-Medium 3-High '-' – No Correlation

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23CEP509

REHABILITATION/ HERITAGE RESTORATION

L T P C
3 0 0 3

OBJECTIVES

- To acquire the maintenance and repair strategies.
- To instruct the importance of strength and durability of concrete.
- To enhance the various types of special concretes.
- To familiarize with the various testing techniques and protection methods.
- To enable the concept of strengthening and restoration of structures.

UNIT I MAINTENANCE AND REPAIR STRATIGES

9

Maintenance, Repair and Rehabilitation - Facets of Maintenance - Importance of Maintenance - Various aspects of Inspection - Assessment procedure for evaluating a damaged structure - causes of deterioration.

UNIT II STRENGTH AND DURABILITY OF CONCRETE

9

Quality assurance for concrete – Strength and Durability of concrete - Cracks, different types, causes-Effects due to climate, temperature, Sustained elevated Temperature, Corrosion.

UNIT III SPECIAL CONCRETES

9

Polymer concrete - Sulphur infiltrated concrete - Fibre reinforced concrete - High strength concrete- High performance concrete - Self compacting concrete - Geopolymer concrete - Concrete made with industrial wastes.

UNIT IV TESTING TECHNIQUES AND PROTECTION METHODS

9

Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection.

UNIT V STRENGTHENING, REPAIR, REHABILITATION AND RESTORATION OF STRUCTURES

9

Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage and earthquake - Restoration of Heritage structures- Case studies.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Identify the importance of inspection and maintenance.
- Construct the Impacts of cracks, corrosion and climate on structures.
- Examine the benefits of various special concretes.
- Analyze the testing techniques and various protection measures.
- Apply the concept of Repair of structures and Restoration of Heritage structures.





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TEXT BOOKS

1. Shetty.M.S. and Jain A.K., "Concrete Technology - Theory and Practice", S.Chand and Company, Eighth Edition, 2019
2. P.C.Varghese, "Maintenance Repair and Rehabilitation & Minor works of building", Prentice Hall India Pvt. Ltd., Sixth Edition, 2020.
3. D. N. Shaw, R T L Allen, S C Edwards, "Repair of Concrete Structures", Taylor & Francis Group, Second Edition, 2022.

REFERENCES

1. Dodge Woodson, "Concrete Structures - Protection, Repair and Rehabilitation", Butterworth-Heinemann, Elsevier, Eleventh Edition 2021.
2. B.Vidivelli, "Rehabilitation of Concrete Structures", Standard Publishes Distribution, Seventh Edition, 2019.
3. Poonam I. Modi, Chirag N. Patel, "Repair and Rehabilitation of Concrete Structures", Prentice Hall India Pvt. Limited, Second Edition, 2019.

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/105/105/105105213/>(Retrofitting and Rehabilitation of Civil Infrastructure)
2. <https://archive.nptel.ac.in/courses/124/105/124105003/>(Architectural and Historic Preservation)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	3	-	-	-	2	1	2	-	-	2	2
2	3	2	3	-	-	-	1	1	2	-	-	2	2
3	3	2	3	-	-	-	1	1	1	-	-	2	1
4	3	2	3	-	-	-	1	1	1	-	-	2	2
5	3	2	3	-	-	-	1	1	1	-	-	2	1
AVG.	3	2	3	-	-	-	1.2	1.0	1.4	-	-	2	1.6

1-Low 2- Medium 3- High '-' – No Correlation

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23CEP510

PREFABRICATED STRUCTURES

L T P C

3 0 0 3

OBJECTIVES

- To foster the basic concepts of prefabrication.
- To impart knowledge on the prefabrication components and systems.
- To acquire the design principles in prefabrication.
- To inculcate the types of joints and connections in structural members.
- To familiarize with the structural stability.

UNIT I INTRODUCTION

9

Need for prefabrication -Advantages and limitations – Principles of prefabrication – Modular coordination – Standardization– Loads and load combinations– Materials – Production – Transportation – Erection.

UNIT II PREFABRICATED COMPONENTS AND SYSTEMS

9

Behaviour and types of structural components– roof and floor slabs – Walls panels - Shear walls - Beams - Columns – skeletal system- portal frame system-Large panel systems- block system.

UNIT III DESIGN PRINCIPLES

9

Design philosophy- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation - Demountable precast concrete systems- Design for stripping , stacking ,transportation and erection of elements.

UNIT IV JOINTS AND CONNECTIONS IN STRUCTURAL MEMBERS

9

Types of Joints – based on action of forces - compression joints - shear joints - tension joints - based on function - construction joints, contraction joints, expansion joints. Design of expansion joints - Dimensions and detailing - Types of sealants - Types of structural connections - Beam to Column - Column to Column - Beam to Beam - Column to foundation.

UNIT V DESIGN FOR ABNORMAL LOADS

9

Progressive collapse – Codal provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse -case study.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Develop the concepts about principles of prefabrication, production, transportation, erection.
- Analyze the prefabricated components.
- Apply the design principles in pre-stressed problems.
- Examine the joints and connection in precast construction.
- Construct the structures for abnormal loads.

TEXT BOOKS

1. Bruggeling A.S. G and Huyghe G.F. "Prefabrication with Concrete", A.A. Balkema Publishers, Eighth Edition, 2021.
2. Lewitt, M. "Precast Concrete- Materials, Manufacture, Properties And Usage", CRC Press, Eleventh Edition, 2020.
3. Galambos T.V, "Structural members and frames", Dover Publications Inc, Third Edition, 2019.

REFERENCES

1. Koncz T., "Manual of precast concrete construction, Vol. I, II and III", Bauverlag, GMBH, 1976.
2. "Handbook on Precast Concrete Buildings", Indian Concrete Institute, 2016.
3. Sukhvarsh Jerath, "Structural Stability Theory and Practice", Wiley Publishers, First Edition, 2021.

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/124/105/124105013/>(Building Materials and Composites)
2. <https://nptel.ac.in/courses/105106117/>(Pre-stressed Concrete Structures)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	3	-	3	-	3	3	2	1	3	2
2	3	1	2	1	-	3	-	3	1	2	1	3	2
3	3	3	3	3	-	3	-	3	2	2	1	3	2
4	3	2	2	2	-	3	-	3	1	2	1	3	2
5	3	2	3	3	-	3	-	3	1	2	1	3	2
AVG.	3	2.2	2.6	2.4	-	3	-	3	1.6	2	1	3	2

1-Low 2-Medium 3-High '-' – No Correlation


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23CEP511

PRESTRESSED CONCRETE STRUCTURES

L T P C

3 0 0 3

OBJECTIVES

- To enhance the principles of pre-stressing.
- To impart knowledge on the design of flexural members.
- To familiarize the concept of design of anchorage zone.
- To foster the design of composite beams and continuous beams.
- To develop the role of pre-stressing in members.

UNIT I INTRODUCTION – THEORY AND BEHAVIOUR

9

Basic principles of pre-stressing – Classification and types – Advantages over ordinary reinforced concrete – Materials – High strength concrete and high tensile steel – Methods of pre-stressing – Freyssinet, Magnel, Lee-McCall and Gifford Udall anchorage systems – Analysis of sections of stresses by stress concept, strength concept and load balancing concept – Losses of pre-stress in post-tensioned and pre-tensioned members.

UNIT II DESIGN FOR FLEXURE AND SHEAR

9

Basic assumptions of flexural design – Permissible stresses in steel and concrete as per I.S. 1343 Code – Different Types of sections - Design of sections of Type I and Type II post-tensioned and pre-tensioned beams – Check for flexural capacity based on I.S. 1343 Code – Influence of Layout of cables in post-tensioned beams – Location of wires in pre-tensioned beams – Design for shear based on I.S. 1343 Code.

UNIT III DEFLECTION AND DESIGN OF ANCHORAGE ZONE

9

Factors influencing deflections – Short-term deflections of uncracked members – Prediction of long-term deflections due to creep and shrinkage – Check for serviceability limit states. Determination of anchorage zone stresses in post-tensioned beams by Magnel's method, Guyon's method and I.S. 1343 code – design of anchorage zone reinforcement – Check for transfer bond length in pre-tensioned beams– design of anchorage zone reinforcement – Check for transfer bond length in pre-tensioned beams.

UNIT IV COMPOSITE BEAMS AND CONTINUOUS BEAMS

9

Analysis and design of composite beams – Shrinkage strain and its importance – Differential shrinkage - Methods of achieving continuity in continuous beams – Analysis for secondary moments – Concordant cable and linear transformation – Calculation of stresses – Principles of design.

UNIT V MISCELLANEOUS STRUCTURES

9

Role of pre-stressing in members subjected to Tensile forces and compressive forces – Design of Tension members and Compression members - Design of Tanks, Pipes, Sleepers and Poles – Partial pre-stressing – methods of achieving partial pre-stressing, merits and demerits of partial pre-stressing.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Inspect the methods of pre-stressing.
- Construct the beams for flexure and shear.
- Analyze the anchorage zone for post-tensioned members and estimate the deflection in beams.
- Design composite members and continuous beams.
- Examine the design of water tanks, pipes, poles and sleepers.

TEXT BOOKS

1. Krishna Raju N., "Pre-stressed concrete", Tata McGraw Hill Company, Fifth Edition 2018.
2. Pandit.G.S. and Gupta. S.P., "Pre-stressed Concrete", CBS Publishers and Distributors Pvt. Ltd, Fourth Edition, 2019.
3. Lewitt,M. " Precast Concrete- Materials, Manufacture, Properties And Usage",CRC Press, Eleventh Edition, 2020.

REFERENCES

1. Rajagopalan.N, "Pre-stressed Concrete", Narosa Publishing House, Second Edition, 2019.
2. Dayaratnam.P., "Pre-stressed Concrete Structures", Oxford and IBH, Eighth Edition, 2021.
3. Galambos T.V, "Structural members and frames", Dover Publications Inc, Third Edition, 2019.

E-RESOURCES

1. [https://nptel.ac.in/courses/105106117/\(Pre-stressed Concrete Structures\)](https://nptel.ac.in/courses/105106117/(Pre-stressed Concrete Structures))
2. [https://nptel.ac.in/courses/105106117\(Pre-stressed Concrete Structures\)](https://nptel.ac.in/courses/105106117(Pre-stressed Concrete Structures))

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	1	-	1	-	1	1	1	1	3	1
2	3	2	3	1	-	1	-	1	1	1	1	3	3
3	3	2	3	1	-	1	-	1	1	1	1	3	3
4	3	2	3	1	-	1	-	1	1	1	1	3	2
5	3	2	3	1	-	1	-	1	1	1	1	3	3
AVG.	3	2.2	3	1	-	1	-	1	1	1	1	3	2.4

1-Low 2-Medium 3-High '-' – No Correlation

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23CEP512

INTRODUCTION TO FINITE ELEMENT METHOD

L T P C

3 0 0 3

OBJECTIVES

- To inculcate the basics of finite element formulation.
- To explore the stiffness matrix formulation.
- To familiarize the applications of one dimensional problems.
- To enhance the two dimensional isoparametric elements.
- To develop the analysis of plates.

UNIT I INTRODUCTION

9

Historical Background – Mathematical Modeling of field problems in Engineering –Governing Equations – Discrete and continuous models – Boundary, Initial and Eigen Value problems– Weighted Residual Methods – Variational Formulation of Boundary Value Problems – Ritz Technique – Basic concepts of the Finite Element Method.

UNIT II STIFFNESS MATRIX FORMULATION

9

Introduction to Discrete and Continua elements – Discrete Elements - Direct stiffness method - Special characteristics of stiffness matrix - Assemblage of elements – Boundary condition & reaction - 2D – truss element - 2D - beam element - Analysis of framed Structures - Basic steps in finite element analysis - Differential equilibrium equations - strain displacement relation - linear constitutive relation - Numerical methods in finite element analysis- Gauss elimination method.

UNIT III ONE DIMENSIONAL PROBLEMS

9

One Dimensional Second Order Equations – Discretization – Element types- Linear and Higher order Elements – Continua Elements - Displacement models - convergence requirements. Natural coordinate systems - Shape function. Interpolation function. Linear and quadratic elements - Lagrange & Serendipity elements. Strain displacement matrix - element stiffness matrix and nodal load vector. Natural frequencies of longitudinal vibration and mode shapes.

UNIT IV TWO DIMENSIONAL PROBLEMS

9

Two dimensional isoparametric elements - Four noded quadrilateral elements - triangular elements. Computation of stiffness matrix for isoparametric elements - numerical integration (Gauss quadrature) Convergence criteria for isoparametric elements.

UNIT V ANALYSIS OF PLATES

9

Introduction to Plate Bending Problems - displacement functions – Analysis of Thin Plate - Analysis of Thick Plate - Analysis of Skew Plate, Finite Element Analysis of Shell, plane stress and plane strain analysis, Example problem using any general-purpose finite element software.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Apply the basic concepts of the Finite Element Method.
- Analyze the stiffness matrix for beam, truss and framed structures.
- Identify the finite element formulations to solve one-dimensional problems.
- Analyze two dimensional problems using finite element method.
- Examine the plate bending problems using finite element method.

TEXT BOOKS

1. Rao, S.S., "The Finite Element Method in Engineering", Butterworth Heinemann, Sixth Edition, 2012.
2. Reddy, J.N., "Introduction to the Finite Element Method", Tata McGrawHill, Fourth Edition, 2019.
3. Ioannis Koutromanos, "Fundamentals of Finite Element Analysis", Third Edition, Wiley Publishers, 2021.

REFERENCES

1. Nam H Kim, bhavani V.Sankar & Ashok V.Kumar, "Introduction to Finite Element Analysis", Second Edition, Wiley Publishers, 2020.
2. Chandrupatla.R.T. and Belegundu.A.D., "Introduction to Finite Elements in Engineering", Pearson Education, Fourth Edition, 2022.
3. David Hutton, "Fundamentals of Finite Element Analysis", Second Edition, Wiley Publishers, 2019.

E-RESOURCES

1. <https://nptel.ac.in/courses/112/104/112104193/>(Basics of Finite Element Analysis – I)
2. <https://nptel.ac.in/courses/105106117/>(Pre-stressed Concrete Structures)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	3	1	-	1	-	2	1	1	1	3	2
2	3	2	3	1	-	1	-	2	1	1	1	3	2
3	3	2	3	1	-	1	-	2	1	1	1	3	2
4	3	2	3	1	-	1	-	2	1	1	1	3	2
5	3	2	3	1	1	1	-	2	1	1	1	3	2
AVG.	3	2	3	1	1	1	-	2	1	1	1	3	2

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BOS





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23CEP513

PROFESSIONAL ELECTIVE III FORMWORK ENGINEERING

L T P C
3 0 0 3

OBJECTIVES

- To acquire the principles, planning, and safety aspects of formwork systems.
- To enhance the formwork materials and pressures on formwork.
- To instruct the design of formwork and false work for structural elements.
- To impart knowledge on the formwork for special structures.
- To inculcate formwork failures through practical case studies.

UNIT I INTRODUCTION TO FORM WORK

9

Introduction to Formwork and false work, Temporary work systems, Requirements, Construction planning and site constraints, Selection, and Classification (Types) of Formwork, General objectives of formwork building - Planning for safety - Development of a Basic System - Key Areas of cost reduction - Planning examples - Overall Planning - Detailed planning - Overall programme - Detailed programme - Costing - Planning crane arrangements - Site layout plan - Formwork beams - Scaffold frames - Framed panel formwork.

UNIT II FORMWORK MATERIALS ACCESSORIES & PRESSURES

9

Formwork Materials, Accessories and consumables – Application of tools, Reconstituted wood – Steel- Aluminum Plywood - Types and grades Standard units - Corner units – Pass units, Calculation of labour constants - Formwork hours - Labour Requirement. Hardware and fasteners - Nails in Plywood- Allowable withdrawal load and lateral load. Pressures on formwork - Examples - Finish - Sheathing boards working stresses - Repetitive member stress Vertical loads for design of slab forms - Uplift on shores - Laterals loads on slabs and walls.

UNIT III FORMWORK DESIGN

9

Concepts, Formwork Systems — components, assembly, De-shuttering, safety of work and Design for Tall Structures, Foundation Wall, Column, Slab and Beam formworks. Design of Decks and Falseworks. Effects of various loads. Loading and moment of formwork, IS Code provisions.

UNIT IV FORMWORK FOR SPECIAL STRUCTURES

9

Formwork for Bridge Structures, Shells, Domes, Folded Plates, Overhead Water Tanks, Natural Draft Cooling Tower, Nuclear Reactor, Tunnel, Lift Shaft, stairs and Formwork for Precast Concrete. Various climbing system, Table lifting system.

UNIT V CASE STUDIES

9

Formwork failures: Causes of failures – Inadequate shoring inadequate bracing of members – improper vibration – Premature stripping Errors in design – Case studies – Finish of exposed concrete design deficiencies – Safety factors – Prevention of rotation –





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Stripping sequence – failure formwork issues in multi - story building construction – vertical and horizontal elements used in the industry.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Construct the overall and detailed planning of formwork.
- Analyze the formwork materials, accessories, pressures and labour requirement.
- Apply the design, construction and erection of formwork.
- Classify the different types of form work used for special structures.
- Examine the errors in design and formwork failures through case studies.

TEXT BOOKS

1. Peurify R.L ,Oberlender G.D , "Formwork for Concrete Structures", McGraw Hill Education India ,Fourth Edition,2019
2. Jha K N, "Formwork for Concrete, Tata McGraw Hill Education", Eighth Edition, 2022.
3. Krishnaraju N., "Concrete Technology", CBS Publishers, Tenth Edition, 2020.

REFERENCES:

1. Austin, C.K., "Formwork for Concrete", Cleaver Press Ltd., Thirteenth Edition 2020.
2. Hurd, M.K., "Formwork for Concrete", Special Publication No.4, American Concrete Institute, Detroit, 2018.
3. Michael P. Hurst, "Concrete Structures", Construction Press, Seventh Edition, 2018.

E-RESOURCES

1. <https://nptel.ac.in/courses/105/104/105104030/> (Concrete Technology)
2. <https://nptel.ac.in/courses/105/102/105102088/> (Formwork)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	-	-	-	-	2	2	-	3	-	3	3	-
2	3	3	3	2	-	-	2	-	3	-	2	3	2
3	3	3	3	2	2	-	-	-	3	-	2	3	3
4	3	3	-	-	-	-	-	-	2	-	2	3	-
5	3	1	2	3	-	-	-	-	2	-	3	3	-
AVG.	3	2.5	2.7	2.3	2	2	2	-	2.6	-	2.4	3	2.5

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS





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23CEP514

CONSTRUCTION EQUIPMENT AND MACHINERY

L T P C

3 0 0 3

OBJECTIVES

- To familiarize the field of construction equipments.
- To acquire the types and applications of earthwork equipment and operations.
- To develop the basic concepts of construction equipment.
- To enhance the fundamentals of asphalt production and placement.
- To foster the material handling and lifting equipment used in construction projects.

UNIT I CONSTRUCTION EQUIPMENTS

9

Identification - Planning of equipment - Selection of equipment - Equipment management in projects- Maintenance management - Equipment cost - Operating cost - Cost control of equipment - Depreciation analysis - Replacement analysis - Safety management.

UNIT II EQUIPMENT FOR EARTHWORK

9

Fundamentals of earthwork operations - Earth moving operations - Types of earthwork equipment - Tractors, motor graders, scrapers, front end loaders - Dozer, excavators, rippers, loaders, trucks and hauling equipment, compacting equipment, finishing equipment - Case studies on earthwork equipment.

UNIT III OTHER CONSTRUCTION EQUIPMENT

9

Equipment for dredging, trenching, drag line and clamshells, tunneling - Jacking equipment - Equipment for drilling and blasting - Pile driving equipment - Erection equipment - Crane, mobile crane - Types of pumps used in construction - Equipment for dewatering, grouting and demolition.

UNIT IV ASPHALT AND CONCRETE PLANTS

9

Aggregate production - Different crushers - Feeders - Screening equipment - Handling equipment - Batching and mixing equipment - Ready mix concrete equipment, concrete pumping equipment - Asphalt plant - Asphalt pavers - Asphalt compacting equipment.

UNIT V MATERIALS HANDLING EQUIPMENT

9

Forklifts and related equipment - Portable material bins - Material handling conveyors - Material handling cranes - Industrial trucks - Aerial transporting equipment.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Select appropriate construction equipment for projects.
- Analyze equipment costs, maintenance, and replacement strategies.
- Apply earthwork equipment for efficient excavation and compaction operations.
- Develop the working of concrete, asphalt, and special construction equipment.
- Examine the suitable material handling equipment for safe and efficient site operations.

TEXTBOOKS

1. Peurifoy, R.L., Schexnayder, C., Schmitt, R.L. and Aviad Shapira., "Construction Planning, Equipment and Methods", McGraw Hill, Ninth Edition, 2018.
2. Granberg G., Popescu M. "Construction Equipment and Management for Engineers Estimators and Owners", Taylor and Francis Publishers, Sixth Edition, 2020.
3. Charles D. Reese, James Vernon Eidson, "Handbook of OSHA construction safety and health", Taylor & Francis, Second Edition 2019.

REFERENCES

1. Deodhar, S.V. "Construction Equipment and Job Planning", Khanna Publishers, Fourth Edition, 2020.
2. Arora S.P. and Bindra S.P., "Building Construction, Planning Techniques and Method of Construction", Dhanpat Rai and Sons, Eleventh Edition, 2022.
3. Sharma S.C. "Construction Equipment", Khanna Publishers, Second Edition 2019.

E-RESOURCES

1. <https://nptel.ac.in/courses/105/103/105103206/> (Construction methods and equipment)
2. https://onlinecourses.nptel.ac.in/noc21_ce21/preview (Construction equipment)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	3	2	2	3	2	2	3	2	2	3	2
2	3	3	2	2	3	2	2	2	2	2	3	2	2
3	3	3	2	2	2	3	2	2	3	2	2	2	3
4	3	2	3	3	2	3	3	2	3	2	2	3	2
5	3	2	3	2	3	2	3	3	3	2	2	2	2
AVG.	3	2.4	2.6	2.2	2.4	2.6	2.4	2.2	2.8	2	2.2	2.4	2.2

1-Low 2-Medium 3-High '-' – No Correlation


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TIRUCHENGODE- 637 205



23CEP515 SUSTAINABLE CONSTRUCTION AND LEAN CONSTRUCTION

L T P C

3 0 0 3

OBJECTIVES

- To foster the sustainable construction and materials.
- To enhance the concepts of energy calculations.
- To familiarize with the green buildings and environmental effects.
- To inculcate the productivity measurement system.
- To develop the lean construction tools and techniques.

UNIT I INTRODUCTION & MATERIALS USED IN SUSTAINABLE CONSTRUCTION 9

Introduction and definition of Sustainability - Carbon cycle - role of construction material: concrete and steel, etc. - CO₂ contribution from cement and other construction materials - Recycled and manufactured aggregate - Role of QC and durability - Life cycle and sustainability.

UNIT II ENERGY CALCULATIONS 9

Components of embodied energy - calculation of embodied energy for construction materials - Energy concept and primary energy - Embodied energy via-a-vis operational energy in conditioned building - Life Cycle energy use.

UNIT III GREEN BUILDINGS 9

Control of energy use in building – National Building Code (NBC), ECBC code, codes in neighboring tropical countries - OTTV concepts and calculations – Features of LEED and TERI – Griha ratings - Role of insulation and thermal properties of construction materials - influence of moisture content and modeling -Performance ratings of green buildings - Zero energy building

UNIT IV CORE CONCEPTS IN LEAN 9

Introduction to the Course; Lean Overview; Need for Productivity Measurement and improvement; Productivity Measurement System (PMS).

UNIT V LEAN CONSTRUCTION TOOLS AND TECHNIQUES 9

Sampling/ Work Sampling; Survey/ Foreman delay survey; Value Stream/ Process Mapping– 5S , Collaborative Planning System (CPS)/ Last Planner™ System (LPS) – Big Room Approach, IT/BIM and Lean, How to Start Practicing Lean Tools in Project Site.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the various sustainable materials used in construction.
- Construct the method of estimating the amount of energy required for building.
- Apply the features of LEED, TERI and GRIHA ratings of buildings.
- Examine the core concepts of lean construction tools and techniques.
- Apply lean tools & techniques to achieve sustainability in construction projects.

TEXT BOOKS

1. Charles J Kibert, "Sustainable Construction: Green Building Design & Delivery", Wiley Publishers, Fourth Edition, 2020.
2. Steve Goodhew, "Sustainable Construction Process", Wiley Blackwell, Third Edition, 2019.
3. Liv Haselbach, "Sustainable Construction for Engineers", McGraw-Hill Education, Seventh Edition, 2021.

REFERENCES

1. Craig A. Langston & Grace K.C. Ding, "Sustainable Practices in the Built Environment", Butterworth Heinemann Publishers, Ninth Edition, 2020.
2. Ballard, G., Tommelein, I., Koskela, L. and Howell, G., "Lean construction tools and technique", Twelveth Edition, 2022.
3. Abhinandan R. Gupta, S.K Deshmukh, "Sustainable Construction Engineering & Management", Abhinandan Gupta Publications, Tenth Edition, 2020.

E-RESOURCES

1. <https://nptel.ac.in/courses/105102195/> (Sustainable Materials and Green Buildings)
2. <https://nptel.ac.in/courses/124107011/> (Sustainable Architecture)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	-	1	1	-	2	3	1	1	-	2	3	2
2	3	1	3	2	1	2	2	-	1	1	1	3	2
3	3	2	-	3	1	1	1	-	-	-	3	3	3
4	3	1	3	3	2	1	3	1	1	1	3	3	3
5	3	1	2	2	2	2	3	1	-	1	3	3	3
AVG.	3	1.3	2.3	2.2	1.5	1.6	2.4	1	1	1	2.4	3	2.6

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS





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TIRUCHENGODE- 637 205



23CEP516

ADVANCED CONSTRUCTION TECHNIQUES

L T P C

3 0 0 3

OBJECTIVES

- To acquire knowledge on the latest construction techniques applied to engineering construction for sub structure.
- To explore the concepts of super structure for buildings.
- To inculcate the construction of special structures.
- To impart the concepts of repair methods and various strengthening.
- To foster the demolition and dismantling techniques.

UNIT I SUB STRUCTURE CONSTRUCTION

9

Construction Methodology - Box jacking - Pipe jacking - Under water construction of diaphragm walls and basement - Tunneling techniques - Piling techniques - Driving well and caisson - sinking cofferdam - cable anchoring and grouting - Driving diaphragm walls, Sheet piles - Laying operations for built up offshore system - Shoring for deep cutting - Large reservoir construction - well points - Dewatering for underground open excavation.

UNIT II SUPER STRUCTURE CONSTRUCTION FOR BUILDINGS

9

Vacuum dewatering of concrete flooring - Concrete paving technology - Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections - Erection techniques of tall structures, Large span structures - launching techniques for heavy decks - in-situ prestressing in high rise structures, Post tensioning of slab- aerial transporting - Handling and erecting lightweight components on tall structures.

UNIT III CONSTRUCTION OF SPECIAL STRUCTURES

9

Erection of lattice towers - Rigging of transmission line structures - Construction sequence in cooling towers, Silos, chimney, sky scrapers - Bow string bridges, Cable stayed bridges - Launching and pushing of box decks - Construction of jetties and break water structures - Construction sequence and methods in domes - Support structure for heavy equipment and machinery in heavy industries- Erection of articulated structures and space decks.

UNIT IV REHABILITATION AND STRENGTHENING TECHNIQUES

9

Seismic retrofitting - Strengthening of beams - Strengthening of columns - Strengthening of slab - Strengthening of masonry wall, Protection methods of structures, Mud jacking and grouting for foundation - Micro piling and underpinning for strengthening floor and shallow profile - Sub grade water proofing, Soil Stabilization techniques.

UNIT V DEMOLITION

9

Demolition Techniques, Demolition by Machines, Demolition by Explosives, Advanced techniques using Robotic Machines, Demolition Sequence, Dismantling Techniques, Safety precaution in Demolition and Dismantling.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the modern construction techniques used in the sub structure construction.
- Construct the principles and concepts relevant to superstructure construction for buildings.
- Examine the concepts used in the construction of special structures.
- Analyze the various strengthening and repair methods for different cases.
- Apply the suitable demolition technique for demolishing a building.

TEXT BOOKS

- Robertwade Brown, "Practical foundation engineering hand book", McGraw Hill Publications, Third Edition, 2018.
- Sankar, S.K. and Saraswati, S., "Construction Technology", Oxford University, Thirteenth Edition, 2021.
- Krishnaraju N., "Advanced Concrete Technology", CBS Publishers, Fourth Edition, 2020.

REFERENCES

- Patrick Powers. J., "Construction Dewatering: New Methods and Applications", John Wiley & Sons, Seventh Edition, 2019.
- Peter H. Emmons, "Concrete repair and maintenance illustrated", Galgotia Publications Pvt. Ltd., Tenth Edition, 2021.
- Santhakumar A.R., "Concrete Technology", Fourteenth Edition, Oxford University Press, 2018.

E-RESOURCES

- <https://nptel.ac.in/courses/105/102/105102012/> (Concrete Technology)
- <https://nptel.ac.in/courses/105/106/105106176/> (Advanced Concrete Technology)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	1	3	3	2	2	-	1	1	2	3	2
2	3	-	-	2	2	2	3	-	1	1	2	2	3
3	3	3	3	2	3	3	2	1	2	2	3	3	3
4	3	3	3	3	2	1	2	1	1	1	2	3	3
5	3	3	3	3	2	2	1	1	2	2	3	2	3
AVG.	3	2.8	2.5	2.6	2.4	2	2	1	1.4	1.4	2.4	2.6	2.8

1-Low 2-Medium 3-High '-' – No Correlation


Chairman - BoS





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23CEP517

CONSTRUCTION MANAGEMENT AND SAFETY

L T P C
3 0 0 3

OBJECTIVES

- To instruct the organization and execution of construction projects.
- To inculcate the project cost estimation and construction economics.
- To familiarize with planning, scheduling, monitoring, and control techniques.
- To enhance the safety management principles and statutory regulations in construction.
- To acquire knowledge of safe operating procedures for construction activities.

UNIT I GENERAL OVERVIEW AND PROJECT ORGANIZATION

9

Introduction - Interdisciplinary nature of modern construction projects – execution of project – evaluation of bids – resource management.

UNIT II ESTIMATION OF PROJECT COST & ECONOMICS

9

Estimating quantities – description of items – estimation of project cost – running account bills – decision making in construction projects – depreciation of construction equipment – case study.

UNIT III PLANNING AND SCHEDULING

9

Introduction – project scheduling – uncertainties in duration of activities using PERT – Project monitoring and control system – resource levelling and allocation – crashing of network.

UNIT IV SAFETY DURING CONSTRUCTION

9

Basic terminology in safety - types of injuries - safety pyramid - Accident patterns - Planning for safety budget, safety culture - Introduction to OSHA regulations - Site safety programs - Job hazard analysis, accident investigation & accident indices-violation, penalty.

UNIT V SAFE OPERATING PROCEDURES

9

Safety during alteration, demolition works – Earthwork, steel construction, temporary structures, masonry & concrete construction, cutting & welding - Construction equipment, materials handling- disposal & hand tools - Other hazards – fire, confined spaces, electrical safety.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the project organization, execution, and resource management.
- Estimate project costs and analyze construction economics.
- Apply planning and scheduling techniques for effective project control.
- Identify construction hazards and implement safety management practices.
- Examine the safe operating procedures for construction works and equipment.





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TEXT BOOKS

1. Albert Lester, "Project Management, Planning and Control", Butterworth- Heinemann, Seventh Edition, 2020.
2. Patrick X.W. Zou ,Riza Yosia Sunindijo, "Strategic Safety Management in Construction and Engineering", John Wiley & Sons, Ltd, Sixth Edition, 2022.
3. Haupt T.C, J. Hinze, "The Management of Construction Safety and Health", Taylor & Francis, Eighth Edition, 2020.

REFERENCES

1. Barcus, S. W. and Wilkinson. J. W., "Hand Book of Management Consulting Services", McGraw Hill, Eighth Edition, 2021.
2. Joy P.K., "Total Project Management", Macmillan Ltd., Tenth Edition, 2019.
3. IS 9457:1980, "Code of practice for safety colors and safety signs" BIS, 1980.

E-RESOURCES

1. <https://nptel.ac.in/courses/105102206/> (Safety in Construction)
2. <https://nptel.ac.in/courses/110105094/> (Industrial Safety Engineering)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	-	-	3	2	-	2	2	3	3	2	2
2	3	3	-	-	3	2	-	2	2	3	3	2	2
3	3	3	3	-	3	-	1	-	-	-	3	3	3
4	3	3	-	2	3	-	2	-	-	-	3	-	-
5	3	3	2	-	-	-	-	-	2	-	2	2	2
AVG.	3	3	2.5	2	3	2	1.5	2	2	3	2.8	2.3	2.3

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ENERGY EFFICIENT BUILDINGS



L T P C

3 0 0 3

OBJECTIVES

- To inculcate the concept of energy consumption in buildings.
- To impart knowledge on the buildings with appropriate ventilation to keep interiors cool.
- To enhance the day lighting and electrical lighting.
- To familiarize with the adequate air exchange to maintain indoor air quality.
- To acquire knowledge on the concept of climatic zone and energy audit.

UNIT I INTRODUCTION

9

Climate adapted and climate rejecting buildings – Heat Transfer – Measuring Conduction – Thermal Storage – Measurement of Radiation – The Greenhouse Effect – Convection – Measuring latent and sensible heat – Psychrometry Chart – Thermal Comfort – Microclimate, Site Planning and Development – Temperature – Humidity – Wind – Optimum Site Locations – Sun Path Diagrams – Sun Protection – Types of Shading Devices – Design responses to energy conservation strategies.

UNIT II PASSIVE SOLAR HEATING AND COOLING

9

General Principles of passive Solar Heating – Key Design Elements – Sunspace – Direct gain – Trombe Walls, Water Walls – Convective Air loops – Concepts – Case Studies – General Principles of Passive Cooling – Ventilation – Principles – Case studies – Courtyards – Roof Ponds – Cool Pools – Predicting ventilation in buildings – Window Ventilation Calculations – Room Organization Strategies for Cross and Stack Ventilation – Radiation – Evaporation and dehumidification – Wind Catchers – Mass Effect – Zoning – Load Control – Air Filtration and odor removal.

UNIT III DAYLIGHTING AND ELECTRICAL LIGHTING

9

Materials, components and details – Insulation – Optical materials – Radiant Barriers – Glazing materials – Glazing Spectral Response – Day lighting – Sources and concepts – Building Design Strategies – Case Studies – Daylight apertures – Light Shelves – Coda requirements – Day lighting design – Electric Lighting – Light Distribution – Electric Lighting control for day lighted buildings – Switching controls – Coefficient of utilization – Electric Task Lighting – Electric Light Zones – Power Adjustment Factors.

UNIT IV HEAT CONTROL AND VENTILATION

9

Hourly Solar radiation – Heat insulation – Terminology – Requirements – Heat transmission through building sections – Thermal performance of Building sections – Orientation of buildings – Building characteristics for various climates – Thermal Design of buildings – Influence of Design Parameters – Mechanical controls – Examples. Ventilation – Requirements – Minimum standards for ventilation – Ventilation Design – Energy Conservation in Ventilating systems – Design for Natural Ventilation – Calculation of probable indoor wind speed.





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UNIT V DESIGN FOR CLIMATIC ZONES

9

Energy efficiency – An Overview of Design Concepts and Architectural Interventions – Embodied Energy – Low Embodied Energy Materials – Passive Downdraft Evaporative Cooling – Design of Energy Efficient Buildings for Various Zones – Cold and cloudy – Cold and sunny – Composite – Hot and dry – Moderate – Warm and humid – Case studies of residences, office buildings and other buildings in each zones – Commonly used software packages in energy efficient building analysis and design - Energy Audit – Certification.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Develop the environmental energy supplies on buildings.
- Construct the passives solar heating, cooling system.
- Classify the various aspects of day-lighting and electrical lighting in a building.
- Design the building ventilation and heat control for indoor comfort.
- Apply simulation programs of buildings to perform energycalculations.

TEXT BOOKS

1. John Krigger and Chris Dorsi, "Residential Energy: Cost Savings and Comfort for Existing Building", Saturn Resource Management, Sixth Edition, 2019.
2. Brown, G.Z. and DeKay, M., "Sun, Wind and Light - Architectural Design Strategies", John Wileyand Sons Inc, Third Edition, 2020.
3. Rustagi ,V. "Energy Efficient Buidings", Gullybaba Publishing Ltd, Second Edition, 2023.

REFERENCES

1. Energy Conservation Building Code, cau of Energy Efficiency, 2018.
2. Handbook on Functional Requirements of Buildings Part 1 to 4 SP: 41, 1995.
3. Majumdar M, "Energy Efficient Buidings in India", Ministry of Non-Conventional Energy Resources, 2001.

E-RESOURCES

1. <https://nptel.ac.in/courses/121/106/121106014/> (Energy Efficient Buildings)
2. <https://nptel.ac.in/courses/108/105/108105058/> (Energy Resources & Technology)





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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	-	2	-	-	1	-	3	2	3	-	3	2
2	3	-	2	-	-	-	-	3	-	3	-	3	2
3	3	-	2	-	-	-	-	3	-	3	-	3	2
4	3	3	3	-	-	-	1	3	-	3	-	3	3
5	3	3	3	1	2	-	1	3	2	3	-	2	3
AVG.	3	3	2.4	1	2	1	1	3	2	3	-	2.8	2.4

1-Low 2-Medium 3-High '-' – No Correlation


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23CEP601

PROFESSIONAL ELECTIVE – IV URBAN PLANNING AND DEVELOPMENT

L T P C
3 0 0 3

OBJECTIVES

- To inculcate the basic concepts of urban areas and their infrastructure.
- To enhance understanding of the planning process of urban areas.
- To acquire knowledge on development plans and their evaluation.
- To familiarize students with the techniques involved in plan implementation.
- To foster the regulations and laws related to urban planning.

UNIT I INTRODUCTION

9

Definition of Human settlement, Urban area, Town, City, Metropolitan City, Megalopolis, Urbanisation, Urbanism, Suburbanisation, Urban sprawl, Peri-urban areas, Central Business District (CBD), Urban Agglomeration, Census definition of urban settlements, Classification of urban areas – Positive and negative impacts of urbanisation, - Atal Mission for Rejuvenation and Urban Transformation (AMRUT).

UNIT II PLANNING PROCESS AND THEORIES

9

Principles of Planning –Stages in Planning Process – Goals, Objectives, Delineation of Planning Areas, Draft Plans, Evaluation, Final Plan. Planning Theories - Garden City Concept, Geddesian Triad by Patrick Geddes, Modernism Concept by Le-Corbusier, Radburn Concept, Neighbourhoods, Theories of Ekistics, Bid-rent Theory by William Alonso, Green Belt Concept

UNIT III DEVELOPMENT PLANS, PLAN FORMULATION AND EVALUATION

9

Types of plans – Regional Plan, Master Plan, Structure Plan, Detailed Development Plan, New Town/ Satellite town- Development Plan, urban nodes, Smart City Plan -Scope and Content of Regional Plan (RP), Master Plan (MP), and the Detailed Development Plan (DDP), Methodologies for the preparation of the RP, MP, and the DDP – Case Studies.

UNIT IV PLAN IMPLEMENTATION

9

Planning Standards, Project Formulation and evaluation; Project Report preparation and presentation; Legal, Financial and Institutional constraints – Problems due to multiple laws, rules and institutions; Financing of Urban Development Projects; Urban planning agencies and their functions in the plan formulation and implementation

UNIT V URBAN AND REGIONAL PLANNING LEGISLATIONS, REGULATIONS AND DESIGNS

9

Town and Country Planning, Local Bodies and Land Acquisition Acts, Development and Building Rules, Site analyses, Layouts and Buildings Design.

TOTAL: 45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the basic issues and meaning of terminologies in urban planning.
- Classify the different types of theories of urban planning and city development.
- Examine the different types of plan, their strategies and their preparation process
- Construct the planning standards, evaluate the constraints and the financial mechanism
- Inspect the various town and country planning acts and their functions.

TEXT BOOKS

1. Goel, S.L, "Urban Development and Management", Deep and Deep publications, New Delhi 2002.
2. George Chadwick, "A Systems view of planning", Pergamon press, Oxford Press, 1978.
3. Singh V.B, "Revitalised Urban Administration in India", Kalpaz publication, New Delhi, 2001.

REFERENCES

1. Thooyavan, K.R, "Human Settlements – A Planning Guide to Beginners", M.A Publications, Chennai, 2005.
2. Tamil Nadu Town and Country Planning Act, and Rules made there under, Government of Tamil Nadu, Chennai, 1971.
3. Tamil Nadu Combined Development and Building Rules, 2019.

E-RESOURCES

1. <https://nptel.ac.in/courses/105/105/105105208/> (Urban Transport Systems Planning)
2. <https://archive.nptel.ac.in/courses/124/107/124107007/> (Urban governance and development Management)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	1	-	-	-	3	-	-	3	1	3	3	2
2	2	1	3	2	-	3	-	2	2	1	3	3	3
3	3	1	3	-	-	2	-	-	2	2	2	2	2
4	3	1	2	2	-	-	-	2	3	2	3	2	1
5	3	2	1	2	-	3	-	2	2	2	3	1	1
AVG.	3	1.2	2.3	2	-	2.8	-	2	2.4	1.6	2.8	2.2	1.8

1-Low 2-Medium 3-High '-' – No Correlation

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23CEP602

SMART CITIES

L T P C
3 0 0 3

OBJECTIVES

- To inculcate the basic concepts of smart cities.
- To enhance knowledge of smart physical infrastructure and transport systems in smart cities.
- To acquire insights into sustainability and smart city planning.
- To familiarize students with the application of technologies in smart cities.
- To develop knowledge of smart city project management concepts.

UNIT I INTRODUCTION

9

Urbanisation, need of focused development, role of Authorities, Smart city, Opportunity and Challenges- Smart infrastructures for city- Smart Cities Mission

UNIT II SMART PHYSICAL INFRASTRUCTURE

9

Infrastructure development in Smart Cities - Physical Infrastructure, Land Use - Compact/mixed-use development, Transit oriented development (TOD); Smart City Management-Transportation Unified governance structure (UMTA). Smart public transportation, Smart parking, Intelligent traffic management, Detour management; Low emission vehicles, Electric Mobility - Environmental projects etc

UNIT III SUSTAINABILITY AND SMART PLANNING

9

Relationship Between Sustainability and Smart planning - Place making project guidelines Surveillance, Smart Street Lighting, Intelligent Emergency Services, Intelligent Disaster Forecasting and Management, GIS-based Spatial Decision Support Systems, Smart Communication Services;

UNIT IV APPLICATION OF TECHNOLOGIES IN SMART CITIES

9

Role of Technologies in Smart Cities - Integrated Command and Control Center (ICCC), Data Analytics, Data driven strategies implementation in smart cities

UNIT V SMART CITIES PROJECT MANAGEMENT

9

Need for project management, Philosophy and concepts; Project phasing and stages; Project organizational structuring; Planning and Scheduling; Project cost analysis; Procurement and Contracting; PPP; Project Monitoring and Evaluation; Risk Management; Case studies.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Examine the basics of urbanization and the role of smart cities.
- Construct the implementation of smart physical infrastructure.
- Use the role of smart planning for sustainable development.
- Analyze the knowledge of technologies in smart city planning.
- Examine the case studies of smart city projects.

TEXT BOOKS

1. Moustafa Baraka, Syed M. Ahmed., "Design and Construction of Smart Cities: Toward Sustainable Community", Springer, First Edition, 2021.
2. Anil Kumar, "Introduction to Smart Cities", Pearson India, First Edition, 2019.
3. Chatterjee U, Biswas A, Majumdar S, "Advances in Urbanism, Smart Cities, and Sustainability", CRC Press, First Edition, 2022.

REFERENCES

1. P Sharma , "Sustainable Smart cities in India, Challenges and Future Perspectives", Springer Link, 2017
2. Sameer Sharma, "Smart Cities Unbounded- Ideas and Practice of Smart Cities in India", Bloomsbury India, 2018.
3. Binti Singh, Manoj Parmar, "Smart City in India Urban Laboratory, Paradigm or Trajectory", Routledge India, 2019.

E-RESOURCES

1. <https://nptel.ac.in/courses/105105160/> (Integrated Waste Management for a Smart City)
2. <https://nptel.ac.in/courses/105106188/> (Infrastructure Planning and Managements)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	1	2	1	-	2	-	1	1	2	2	3	3
2	3	3	3	2	-	3	-	2	3	1	3	3	3
3	3	1	3	2	-	1	-	3	2	2	3	3	2
4	3	2	2	2	-	2	-	2	3	1	3	3	2
5	3	2	3	3	-	2	-	2	3	3	2	2	3
AVG.	3	1.8	2.6	2	-	2	-	2	2.4	1.8	2.6	2.8	2.6

1-Low 2-Medium 3-High '-' – No Correlation

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23CEP603

INTELLIGENT TRANSPORT SYSTEMS

L T P C
3 0 0 3

OBJECTIVES

- To strengthen the fundamentals of ITS.
- To enhance knowledge of data collection applications in ITS.
- To acquire knowledge of the importance of ITS in traffic management.
- To familiarize students with the implementation of ITS in developing countries.
- To inculcate understanding of ITS applications in logistics.

UNIT I INTRODUCTION

9

Fundamentals of ITS: Definition of ITS, Challenges in ITS Development-Purpose of ITS Deployment Benefits of ITS- Overview of application of ITS in Transportation Planning.

UNIT II DATA COLLECTION THROUGH ITS

9

Sensors & its application in traffic data collection - Elements of Vehicle Location and Route Navigation and Guidance concepts; ITS Data collection techniques – vehicle Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), GIS, RFID, video data collection, Internet of Things (IOT)

UNIT III ITS IN TRAFFIC MANAGEMENT

9

ITS User Needs and Services and Functional areas –Introduction, Advanced Traffic Management systems (ATMS), Advanced Traveler Information systems (ATIS), Advanced Vehicle Control systems (AVCS), Advanced Public Transportation systems (APTS), Advanced Rural Transportation systems (ARTS)- Autonomous Vehicles- Autonomous Intersections.

UNIT IV ITS IN TRANSPORTATION PLANNING

9

ITS and safety, ITS and security- Traffic and incident management systems; ITS and sustainable mobility, travel demand management, electronic toll collection, ITS and road-pricing; Transportation network operations – public transportation applications- Weight –in Motion.

UNIT V ITS APPLICATION IN LOGISTICS

9

Commercial vehicle operations and intermodal freight-Fleet Management- IT application in freight logistics-E commerce.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Build the fundamentals of ITS and its benefits.
- Construct the data collection using sensors and its applications.
- Analyze the ITS in Traffic Management.
- Examine the application of ITS in Transportation Planning.
- Develop the application of ITS in Logistics.

TEXT BOOKS

1. R. Srinivasa Kumar, "Intelligent Transportation Systems", Universities Press P Ltd, Telangana, 2022.
2. Intelligent Transport Systems, Intelligent Transportation Primer, Washington, US, 2001.
3. Henry F. Korth, and Abraham Siberschatz, Data Base System Concepts, McGraw Hill, 1992.

REFERENCES

1. Turban E., "Decision Support and Expert Systems Management Support Systems", Maxwell Macmillan, 1998.
2. Sitansu S. Mittra, "Decision Support Systems—Tools and Techniques", John Wiley, New York, 1986.
3. Cycle W. Halsapple and Andrew B. Winston, "Decision Support Systems—Theory and Application", Springer Verlag, New York, 1987.

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/105/101/105101008/> (Fundamental Parameters of Traffic Flow)
2. https://onlinecourses.nptel.ac.in/noc21_ce72/preview (Introduction to Multimodal Urban Transportation Systems (MUTS))

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	1	-	2	-	2	-	1	3	1	2	2	2
2	3	2	1	3	-	2	-	2	3	2	3	2	2
3	3	1	2	2	-	2	-	1	3	2	1	3	2
4	3	2	1	3	-	2	-	1	3	1	3	3	3
5	3	2	1	3	-	2	-	1	3	2	3	3	2
AVG.	3	1.6	1.25	2.6	-	2	-	1.2	3	1.6	2.4	2.6	2.2

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS





23CEP604

INDUSTRIAL WASTE WATER MANAGEMENT

L T P C
3 0 0 3

OBJECTIVES

- To inculcate knowledge of the sources and types of industrial wastewater.
- To enhance understanding of industrial pollution prevention and waste minimization.
- To acquire the basic concepts of industrial wastewater treatment.
- To familiarize students with wastewater reuse and residual management.
- To strengthen awareness of the best applicable technologies for wastewater treatment.

UNIT I INTRODUCTION

9

Industrial scenario in India– Industrial activity and Environment - Uses of Water by industry – Sources and types of industrial wastewater – Nature and Origin of Pollutants - Industrial wastewater and environmental impacts – Regulatory requirements for treatment of industrial wastewater – Industrial waste survey – Industrial wastewater monitoring and sampling – generation rates, characterization and variables –Toxicity of industrial effluents and Bioassay tests – Major issues on water quality management.

UNIT II INDUSTRIAL POLLUTION PREVENTION &WASTE MINIMISATION

9

Prevention Control of Industrial Pollution – Benefits and Barriers – Waste management Hierarchy - Source reduction techniques – Periodic Waste Minimisation Assessments – Evaluation of Pollution Prevention Options – Cost benefit analysis – Pay-back period – Implementing & Promoting Pollution Prevention Programs in Industries.

UNIT III INDUSTRIAL WASTEWATER TREATMENT

9

Flow and Load Equalisation – Solids Separation – Removal of Fats, Oil & Grease- Neutralisation Removal of Inorganic Constituents – Precipitation, Heavy metal removal, Nitrogen & Phosphorous removal, Ion exchange, Adsorption, Membrane Filtration, Electro dialysis & Evaporation –Removal of Organic Constituents – Biological treatment Processes, Chemical Oxidation Processes, Advanced Oxidation processes – Treatability Studies..

UNIT IV WASTE WATER REUSE AND RESIDUAL MANAGEMENT

9

Individual and Common Effluent Treatment Plants – Joint treatment of industrial and domestic wastewater - Zero effluent discharge systems - Quality requirements for Wastewater reuse Industrial reuse , Present status and issues - Disposal on water and land – Residuals of industrial wastewater treatment – Quantification and characteristics of Sludge – Thickening, digestion, conditioning, dewatering and disposal of sludge – Management of RO rejects.

UNIT V CASE STUDIES

9

Industrial manufacturing process description, wastewater characteristics, source reduction options and waste treatment flow sheet for Textiles – Tanneries – Pulp and paper – metal finishing – Sugar and Distilleries.

TOTAL :45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the source and types of industrial wastewater and their environmental impacts.
- Inspect the industrial wastewater pollution and implement pollution prevention.
- Examine the various solid separation techniques and methods.
- Analyze the quality requirements for wastewater reuse and residual management
- Construct the waste water characteristics associated with different industrial sectors.

TEXTBOOKS

1. Lawrance K. Wang, Yung Tse Hung, Howard H.Lo and Constantine Yapijakis "Handbook of Industrial and Hazardous waste Treatment", Second Edition, 2004.
2. Metcalf & Eddy, Inc., George Tchobanoglous, Franklin L. Burton and H. David Stensel, "Wastewater engineering treatment and reuse", Fourth Edition, McGraw-Hill, 2017.
3. Elson L. Nemerow, Franklin J. Agardy and Joseph A. Salvato, "Environmental Engineering: Water, Wastewater, Soil and Groundwater Treatment and Remediation", Sixth Edition, Wiley-VCH, 2009.

REFERENCES

1. Paul L. Bishop, "Pollution Prevention: - Fundamentals and Practice", Mc-Graw Hill International, Boston, 2000.
2. Arceivala J, Shyam. R. Asolekar, "Waste water Treatment for pollution control and reuse", Tata McGraw Hill, 2007.
3. Krishna Kumar, Gaurav Saini, Duc Manh Nguyen, Narendra Kumar, Rachna Shah "Smart Cities: Concepts, Practices, and Applications", CRC Press, First Edition, 2022.

E – RESOURCES

1. <http://acl.digimat.in/nptel/courses/video/105105350/L01.html> (Industrial Waste Water Treatment)
2. <https://nptel.ac.in/courses/105/105/105105048/> (Waste Water Management)

Mapping of COs-POs& PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	1	1	2	-	1	-	1	1	1	3	2	3
2	3	3	2	2	-	3	-	3	3	2	1	2	2
3	3	3	3	1	-	1	-	2	3	2	2	1	2
4	3	1	3	1	-	3	-	3	3	2	1	1	1
5	3	3	2	3	-	2	-	1	1	1	3	3	1
AVG.	3	2.2	2.2	1.8		2		2	2.2	1.6	2	1.8	1.8

1-Low 2-Medium 3-High '-' – No Correlation

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23CEP605

PAVEMENT ENGINEERING

L T P C
3 0 0 3

OBJECTIVES

- To enhance the various types of pavements.
- To impart knowledge on flexible pavement design and specifications.
- To acquire knowledge of the factors influencing rigid pavements and their design.
- To familiarize students with pavement evaluation and maintenance practices.
- To inculcate the stabilization techniques with special reference to highway pavements.

UNIT I PAVEMENT MATERIALS AND SUBGRADE ANALYSIS

9

Introduction – Pavement as layered structure – Pavement types -rigid and flexible-Subgrade analysis- Stress and deflections in pavements- Pavement Materials and Testing- Modified Binders.

UNIT II DESIGN OF FLEXIBLE PAVEMENTS

9

Flexible pavement design – Advantages and disadvantages -Factors influencing design of flexible pavement, Empirical – Mechanistic empirical and theoretical methods – Design procedure as per IRC guidelines – Design and specification of rural roads.

UNIT III DESIGN OF RIGID PAVEMENTS

9

Cement concrete pavements Factors influencing CC pavements – Modified Westergaard approach – Design procedure as per IRC guidelines – Concrete roads and their scope in India.

UNIT IV PAVEMENT CONSTRUCTION, EVALUATION AND MAINTENANCE

9

Construction Techniques practice of flexible and concrete pavement Pavement Evaluation - Causes of distress in rigid and flexible pavements – Evaluation based on Surface Appearance, Cracks, Patches and Pot Holes, Undulations, Raveling, Roughness, Skid Resistance. Structural Evaluation by Deflection Measurements - Pavement Serviceability index, - Pavement maintenance (IRC Recommendations only).

UNIT V STABILIZATION OF PAVEMENTS

9

Stabilization with special reference to highway pavements – Choice of stabilizers – Testing and field control - Stabilization for rural roads in India – Use of Geosynthetics in roads.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Classify the types of rigid and flexible pavements.
- Construct the design of flexible pavements.
- Analyze the design of rigid pavements.
- Identify the causes of distress in rigid and flexible pavements.
- Develop the stabilization of pavements, testing and field control.





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TEXT BOOKS

1. Rajib B. Mallick and Tahar El-Korchi, "Pavement Engineering: Principles and Practice", CRC Press/Taylor & Francis Group, Fourth Edition, 2023.
2. Papagiannakis A.T. and Masad E. A., "Pavement Design and Materials", Wiley & Sons, Second Edition, 2024.
3. Yoder, E. J. and Witczak, M. W., "Principles of Pavement Design", John Wiley & Sons, Second Edition, 2011.

REFERENCES

1. Yoder, R.J. and Witchak M.W. "Principles of Pavement Design", John Wiley, 2016.
2. Nikolaidis A., "Highway Engineering: Pavements, Materials and Control of Quality", CRC Press, First Edition, 2015.
3. IRC- 37, Guidelines for the Design of Flexible Pavements, The Indian Roads Congress, New Delhi, 2001.

E-RESOURCES

1. <https://nptel.ac.in/courses/105/101/105101087/> (Pavement Design)
2. <https://nptel.ac.in/courses/105/105/105105107/> (Introduction to Transport Engineering)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	2	-	1	-	1	1	2	1	3	2
2	3	3	3	3	-	1	-	1	1	3	1	3	3
3	3	3	3	2	-	2	-	1	1	3	2	3	3
4	3	3	2	2	-	2	-	2	2	3	1	3	3
5	3	2	1	1	-	1	-	3	3	3	2	2	1
AVG.	3	2.6	2.2	2	-	1.4	-	1.6	1.6	2.8	1.4	2.8	2.4

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS





23CEP606

TRANSPORTATION PLANNING PROCESS

L T P C
3 0 0 3

OBJECTIVES

- To enhance knowledge of the significance of transportation planning and land-use integration.
- To familiarize students with the concepts and procedures of the trip generation stage.
- To acquire knowledge on the trip distribution stage and its modeling approaches.
- To inculcate the mode choice behaviour and various modes split models.
- To foster knowledge of traffic assignment principles and techniques.

UNIT I TRANSPORTATION PLANNING PROCESS

9

Importance of transportation planning, Integration of Land Use and Transport; Systems Approach to Transport Planning; Four Steps in the Transport Planning Process; Travel Demand Modelling Approach; Traffic Analyses Zones – internal and external; Various Transportation Surveys for the collection of data – methodology, analyses of data and presentation of results.

UNIT II TRIP GENERATION STAGE

9

Definition and importance; Trip Production and Attraction, Types of trips; Factors governing trip generation: population related data, land and building use, socio-economic, Trip generation models: Types, Assumptions made, Multiple Linear Regression, category analysis- merits and de-merits of the model, verification, calibration and validation of the model.

UNIT III TRIP DISTRIBUTION STAGE

9

Definition and objective; Data collection, analyses and presentation of trip matrix table, Desire Line Diagram, Development of Gravity, growth factor methods for Trip Distribution, Calibration of gravity model and its validation.

UNIT IV MODAL SPLIT STAGE

9

Factors influencing mode choice - Household characteristics; Zonal Characteristics; Network characteristics - Modal split: pre distribution or post distribution - Mode wise trip matrix and modal split analyses- Overview of Probit and Logit model.

UNIT V TRAFFIC ASSIGNMENT STAGE

9

Meaning and objective; General principles; Assignment Techniques- all-or-nothing assignments, multiple route assignment, capacity restraint, diversion curves, Trip assignment route selection; Mode-wise trip matrices; element of transportation network, nodes and links, speed flow curves, minimum path trees

TOTAL : 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Build the principles of the transportation planning process and methods of data collection.
- Develop the trip production, trip attraction models and calibration.
- Examine the data collection, analyses and presentation of trip matrix table
- Analyze the trip distribution models and its application.
- Construct the knowledge on the mode choice behaviour and mode split models.

TEXT BOOKS

1. Kadiyali. L.R., Traffic Engineering and Transport Planning, Khanna Publishers, Delhi, 2019.
2. C.S. Papacostas and P.D. Prevedouros, Transportation Engineering and Planning, Prentice Hall of India Pvt. Ltd., 2009.
3. Michael J. Bruton, Introduction to Transportation Planning, Hutchinson, London, 1995.

REFERENCES

1. C. Jotin Khisty, Kent Lall, Transportation Engineering: An Introduction, Prentice Hall, 1998
2. John W. Dickey, Metropolitan Transportation Planning, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1990.
3. James H. Banks, Introduction to Transportation Engineering, Tata McGraw Hill Education Pvt Ltd, 2010

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/105/105/105105208/> (Urban transportation planning)
2. <http://acl.digimat.in/nptel/courses/video/105107210/L01.html> (sustainable transportation system)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	3	-	2	-	2	3	1	3	3	2
2	3	3	3	3	-	1	-	1	1	1	2	2	1
3	3	3	3	3	-	1	-	2	2	1	3	1	1
4	3	2	3	2	-	2	-	2	2	2	3	1	3
5	3	3	2	3	-	3	-	2	1	3	2	3	2
AVG.	3	2.6	2.6	2.8	-	1.8	-	1.8	1.8	1.6	2.6	2	1.8

1-Low 2-Medium 3-High '-' – No Correlation

[Signature]
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PROFESSIONAL ELECTIVE V

23CEP607

OCEAN WAVE DYNAMICS

L T P C

3 0 0 3

OBJECTIVES

- To impart knowledge on the basic equations and conservation of mass.
- To familiarize with the concept of wave theories.
- To acquire knowledge on the momentum and wave kinematics.
- To foster the wave energy transformations.
- To enhance the distribution of waves and wave data.

UNIT I CONSERVATION EQUATIONS OF FLUID FLOW

9

Basic equations — Conservation of mass, moment and Energy - Continuity Equation, Euler's Equation, Newtonian Fluids, Navier-Stokes Equation.

UNIT II WAVE THEORIES

9

Linear wave theory: Governing Equation, Boundary Conditions and solutions, Dispersion relation, Constancy of wave period. Introduction to non-linear wave theories - Stokes, Cnoidal and Solitary wave theory.

UNIT III WAVE KINEMATICS

9

Wave celerity, water particle velocities, accelerations, displacements and pressures. Integral properties of waves: Mass flux, Energy and energy flux, Group speed, Momentum and momentum flux.

UNIT IV WAVE TRANSFORMATIONS

9

Shoaling, bottom friction and damping, refraction, reflection and diffraction. Wave Breaking: Type of breaking, Surf similarity parameter. Keulegan-Carpenter number, Ursell Parameter, Scattering parameter, Reynolds Number

UNIT V WAVE ANALYSIS

9

Short term wave analysis- Short term wave Height Distribution - Wave period Distribution - Time and Frequency domain Analysis of Wave Records - Long term wave analysis - Gumbel Distribution - Weibull Distribution - Statistics analysis of grouped wave data.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Apply the concept of mass, momentum and wave energy transformations.
- Classify the linear and nonlinear wave theories including the stokes theory, solitary and cnoidal wave theories.
- Examine the wave kinematics and its properties.
- Construct the principles of wave transformation.
- Analyze of the long term and short term waves.





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TEXT BOOKS

1. Sarpkaya, T. and Isaacson, M., "Mechanics of Wave Forces on Offshore Structures", VanNostrand Reinhold Co., New York, 2014.
2. Dean, R.G. and Dalrymple, R.A., "Water wave mechanics for Engineers and Scientists", Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 2016.
3. Mei, C.C., Stiassnie, M. & Yue, D.K.P., Theory and Applications of Ocean Surface Waves, World Scientific, Singapore, 2005.

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1. Ippen, A.T., "Estuary and Coastline Hydrodynamics", McGraw-Hill Book Company, inc., New York, 2008.
2. Sorenson, R.M., "Basic Coastal Engineering", A Wiley-Inter science Publication, New York, 2008.
3. Coastal Engineering Manual Volume I and II, Coastal Engineering Research Centr, Dept, of the Army, US Army Corps of Engineers, Washington DC, 2015.

E-RESOURCES

1. [https://onlinecourses.nptel.ac.in/noc20_oe02/preview\(Dynamics of Ocean Structures\)](https://onlinecourses.nptel.ac.in/noc20_oe02/preview(Dynamics of Ocean Structures))
2. [https://onlinecourses.nptel.ac.in/noc24_oc06/preview\(Marine Engineering\)](https://onlinecourses.nptel.ac.in/noc24_oc06/preview(Marine Engineering))

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	-	-	-	-		2	-	-	-		2	3
2	3	2	-	-	-	3	-	3	-	-	2	2	3
3	3	3	2	-	2	2	-	2	-	-	3	3	3
4	3	3	3	-	3	3	-	3	-	2	2	3	3
5	3	3	3	3	3	3	-	3	2	-	3	3	3
AVG.	3	2.8	2.7	3	2.7	2.8	2	2.8	2	2	2.5	2.6	3

1-Low 2-Medium 3-High '-' – No Correlation.


Chairman - BoS



**OBJECTIVES**

- To inculcate the physical and engineering properties of marine soil deposits.
- To impart knowledge on the site investigation of marine soil deposits.
- To familiarize with the behavior of marine deposits.
- To acquire knowledge on the different types of foundations.
- To enhance the marine foundations subjected to wave loading.

UNIT I MARINE SOIL DEPOSITS

9

Marine environment, Physical and engineering properties of marine soils - Specific problems related to marine soil deposits.

UNIT II SITE INVESTIGATION IN THE CASE OF MARINE SOIL DEPOSITS

9

Challenges of site investigation in marine environment, Different site investigation techniques, sampling techniques, Geophysical methods, Recent advancements in site investigation and sampling used for marine soil deposits.

UNIT III BEHAVIOR OF SOILS SUBJECTED TO REPEATED LOADING

9

Effect of wave loading on foundations of marine structures, Behavior of marine deposits under cyclic loading, Cyclic behavior of soils based on fundamental theory of mechanics, Approximate engineering methods.

UNIT IV FOUNDATIONS IN MARINE SOIL DEPOSITS

9

Different offshore and nearshore foundations, Gravity platforms, Jack-up rigs, pile foundations, caissons, spudcans.

UNIT V MARINE FOUNDATIONS SUBJECTED TO WAVE LOADING

9

Cyclic behavior of soils, empirical models, elastic-plastic models, FEM analysis of marine foundations subjected to wave loading.

TOTAL: 45 PERIODS**OUTCOMES**

Upon completion of the course, the students will be able to:

- Construct the physical and engineering properties of marine soil deposits.
- Analyze the effect of wave loading on physical and engineering properties of marine soil deposits.
- Examine investigation program for marine soil deposits.
- Design suitable marine foundation as per project requirement.
- Develop numerical model and design marine foundation subjected to wave loading.





TEXT BOOKS

1. H. G. Poulos. "Marine Geotechnics", Unwin Hyman Ltd, London, UK, 2018.
2. D. V. Reddy and M. Arockiasamy, "Offshore Structures", Volume: 1, R.E. Kreiger Pub and Co., 2020.
3. Ben C. Gerwick Jr., "Construction of Marine and Offshore Structures", CRC Press/Taylor & Francis Group, Third Edition, 2007.

REFERENCES

1. M. Randolph and S. Gourvenec, "Offshore Geotechnical Engineering", CRC Press/Taylor & Francis Group, First Edition, 2011.
2. D. V. Reddy and A. S. J. Swamidas, "Essentials of Offshore Structures: Framed and Gravity Platforms", CRC Press, First Edition, 2014.
3. D. Thomson and D. J. Beasley, "Handbook of Marine Geotechnical Engineering", US Navy, 2016.

E-RESOURCES

1. <https://igs.org.in/storage/annual-lecture/annual-lecture-1989-180523064641.pdf>
(Geotechnical Aspects of Indian Offshore Environment)
2. <https://igs.org.in/storage/annual-lecture/2010-260723045816.pdf> (Geotechnical Problems of Water Resources Development in India)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	2	2	3	2	2	2	1	2	3	3
2	2	2	3	2	1	2	1	2	1	1	2	2	2
3	3	2	1	1	1	2	1	2	2	1	1	2	1
4	3	3	2	1	1	1	2	1	2	2	2	3	2
5	3	2	2	1	2	1	1	1	2	1	1	3	2
AVG.	3	2.4	2	1.4	1.4	1.8	1.4	1.6	1.8	1.2	1.6	2.6	2

1-Low 2-Medium 3-High '-' – No Correlation.


Chairman - BOS





23CEP609

COASTAL ENGINEERING

L T P C

3 0 0 3

OBJECTIVES

- To impart knowledge on the basic concepts of tides and waves.
- To inculcate the characteristics of waves.
- To familiarize with the wave transformation.
- To enhance the sediment analysis and transport.
- To acquire knowledge on the coastal protection measures and coastal structure design.

UNIT I COASTAL ENVIRONMENT

9

Beaches- Coastal features-Coastal Zonation –EEZ-Inshore and Offshore Areas – Mean sea level –Basics of tides and waves –Coastal morphology.

UNIT II WAVES DYNAMICS

9

Basics of waves - Classification - Wave Theory - Physical Characteristics of different types of waves - Linear Wave Theory - Wave celerity - Velocities -Accelerations - Displacements - Wavedynamics in shallow and deep water conditions.

UNIT III NEARSHORE WAVE TRANSFORMATION

9

Shoaling, refraction, diffraction and breaking– Interaction currents and waves- near shore currents- wave run-up and overtopping.

UNIT IV SEDIMENT DYNAMICS AND TRANSPORT

9

Introduction to sediments, Sediment Analysis, types and sizes of sediments, sedimentation processes, sediment Supply & movement - Cross-shore sediment transport - Long shore sedimenttransport - Shoreline Changes - Shoreline Evolution - Erosion & Accretion.

UNIT V SHORE PROTECTION

9

Design of shore defense structures; Hard Engineering measures - Sea walls, Revetments, Bulkheads, Dikes, Groynes, Breakwaters; Soft Engineering measures — Artificial Reefs, Beach nourishment, Dune regeneration, Salt marsh Creation, Bioshields - Case studies

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Examine the basic concepts of coastal environment.
- Construct the sea state parameters (wave height, wave period, water levels) in shallow and deep water conditions.
- Build the principles of near-shore wave transformation.
- Analyze the sediment and its transport processes.
- Evaluate measures to protect beaches from erosion due to waves and currents.





TEXT BOOKS

1. Kamphuis, J.W., "Introduction to coastal engineering and management", 2000.
2. Dean, R.G. and Dalrymple, R.A., "Water wave mechanics for Engineers and Scientists", Prentice-Hall, Englewood Cliffs, New Jersey, 1994.
3. Mani J.S, "Coastal Engineering book", PHI Publishing Company, Second Edition, 2021.

REFERENCES

1. Ippen, A.T., "Estuary and Coastline Hydrodynamics", McGraw-Hill Book Company, Inc., New York, 1978.
2. Sorenson, R.M., "Basic Coastal Engineering", Wiley-Inter science Publication, New York, 1978.
3. Coastal Engineering Manual, Vol. I-VI, Coastal Engineering Research Centre, Dept. of the Army, US Army Corps of Engineers, Washington DC, 2006.

E-RESOURCES

1. [https://doe.iitm.ac.in/coastal-engineering\(Coastal Engineering\)](https://doe.iitm.ac.in/coastal-engineering(Coastal Engineering))
2. [http://cwprg.gov.in/Page/Coastal-Engineering.aspx\(Coastal Engineering\)](http://cwprg.gov.in/Page/Coastal-Engineering.aspx(Coastal Engineering))

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	-	-	-	-	-	2	-	-	3	-	1	-
2	3	3	3	-	-	-	-	3	-	3	-	3	3
3	3	3	2	-	2	2	-	2	-	2	-	2	3
4	3	3	3		3	3	-	3	-		-	3	3
5	3	3	3	3	3	3	-	3	-	3	-	3	3
AVG.	3	3	2.8	3	2.7	2.7	2	2.8	-	2.8	-	2.4	3

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23CEP610

OFFSHORE STRUCTURES

L T P C

3 0 0 3

OBJECTIVES

- To impart knowledge on the offshore environment and ocean waves.
- To familiarize with the different types of offshore structures.
- To enhance the design concepts of offshore structures.
- To foster the pipeline elements and types of pipelines.
- To inculcate knowledge on the accidental loads and types of corrosion.

UNIT I INTRODUCTION TO OFFSHORE ENVIRONMENT

9

Ocean winds-characterization of wind regime-wind velocity profile, Ocean waves-wave parameters- Introduction to Airy's wave theory and its applications-brief about time and frequency domain analysis, brief introduction about ocean currents-tides, seaquakes, Ice environment, Ice-sea interactions.

UNIT II TYPES OF OFFSHORE STRUCTURES

9

Offshore Structures-need for offshore structures. Types of Offshore Structures - components - materials used-design parameters-suitable environment conditions - construction practices - drawbacks - EIA for Offshore structures.

UNIT III FORCES ON OFFSHORE STRUCTURES

9

Introduction-Permanent loads-operating loads. Environmental forces-wind force-wave force-current force-seaquake force-Ice force. Force due to tides - Marine growth - Use of API RP 2A guidelines.

UNIT IV SUBMARINE PIPELINES AND RISERS

9

Pipeline elements-types of pipelines-laying method-materials. Pipe wall thickness verification. Pipeline stability. Design using DNV 81 code.

UNIT V ACCIDENTAL LOADS AND CORROSION

9

Fire, Blast and Collision- Behavior of steel at elevated temperature- Fire rating for Hydrocarbon fire, Blast Mitigation-Blast walls- Collision of boats and energy absorption - Corrosion- Corrosion mechanism- Types of corrosion- Offshore structure corrosion zones- Biological corrosion-Preventive measures of corrosion- Online corrosion monitoring- Corrosion fatigue

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Construct the offshore environment and technical terms associated with it.
- Classify the types and choose suitable offshore structures according to environmental conditions.
- Analyze the various types of forces acting on the offshore structures.
- Examine the appropriate codes to design the submarine pipelines.
- Inspect the accidental loads and corrosion on offshore structures.





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TEXT BOOKS

1. B.C Gerwick, "Construction of Marine and Offshore Structures", CRC Press, Florida, 2000.
2. Clauss, G, Lehmann, E and Ostergaard, C, "Offshore Structures, Vol. 1 & 2", Verlag, 2004.
3. Reddy, D. V and Arockiasamy, M., "Offshore Structures Vol.1 & 2", Kreiger Publication Company, 2016.

REFERENCES

1. Graff, W. J., "Introduction to Offshore Structures", Gulf Publication Company, 1981.
2. Dawson, T. H., "Offshore Structural Engineering", Prentice Hall, 1983.
3. API RP 2A. "Planning, Designing and Constructing Fixed Offshore Platforms", API. 2000.

E-RESOURCES

1. [https://onlinecourses.nptel.ac.in/noc22_oe04/preview\(Computer Methods of Structural Analysis of Offshore Structures\)](https://onlinecourses.nptel.ac.in/noc22_oe04/preview(Computer Methods of Structural Analysis of Offshore Structures))
2. [https://onlinecourses.nptel.ac.in/noc21_oe01/preview \(Offshore Structures Under Special Environmental Loads Including Fire Resistance\)](https://onlinecourses.nptel.ac.in/noc21_oe01/preview (Offshore Structures Under Special Environmental Loads Including Fire Resistance))

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	1	1	2	2	1	2	1	1	3	2
2	3	2	2	1	1	2	2	1	2	1	2	3	2
3	3	3	3	3	3	3	2	2	2	2	2	3	3
4	3	3	3	3	3	3	2	2	2	2	2	3	3
5	3	2	1	1	2	2	2	1	2	1	1	3	2
AVG.	3	2.4	2.2	1.8	2.0	2.4	2.0	1.4	2.0	1.4	1.6	3	2.4

1-Low 2-Medium 3-High '-' – No Correlation.


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23CEP611

RAILWAY, AIRPORT AND HARBOUR ENGINEERING

L T P C

3 0 0 3

OBJECTIVES

- To instruct route alignment surveys using conventional and modern techniques.
- To familiarize students with tunneling methods, drainage, and ventilation requirements in railway construction.
- To develop the functional layout of airports including aprons, terminals, hangars, and parking systems.
- To enhance the elements of airport zoning, marking, and lighting systems.
- To foster the components and functions of harbours and ports.

UNIT I RAILWAY PLANNING AND DESIGN

9

Significance of Road, Rail, Air and Water transports – Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings – Track Stress, coning of wheels, creep in rails, defects in rails – Route alignment surveys, conventional and modern methods – Geometric design of railways, gradient, super elevation, widening of gauge on curves – Points and Crossings.

UNIT II RAILWAY CONSTRUCTION AND MAINTENANCE

9

Tunneling Methods, drainage and ventilation – Materials required for track laying – Construction and maintenance of tracks – Modern methods of construction and maintenance – Railway stations and yards and passenger amenities Urban rail – Infrastructure for Metro, Mono and underground railways - Bullet Train.

UNIT III AIRPORT PLANNING

9

Air transport characteristics – Airport classification – Airport planning: objectives, components, airport layouts – Apron, terminal building, hangars, motor vehicle parking area and circulation pattern, socio-economic.

UNIT IV AIRPORT DESIGN

9

Runway Design: Orientation, Wind Rose Diagram (Problems) – Runway length – Problems on basic and Actual Length, Geometric design of runways, Configuration – Elements of Taxiway Design – Airport Zones – Passenger Facilities and Services – Runway and Taxiway Markings and lighting.

UNIT V HARBOUR ENGINEERING

9

Definition of Basic Terms: Harbor, Port, Satellite Port, Docks, Waves and Tides – Planning and Design of Harbours : Requirements, Classification – Coastal Structures: Piers, Break waters, Wharves, Jetties, Quays, Spring Fenders, Dolphins and Floating Landing Stage – Mooring, types of mooring – Navigational aids – Inland Water Transport – Wave action on Coastal Structures, Coastal zone regulations and Coastal Protection Works.

TOTAL: 45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Develop the route alignment methods and design elements in railway planning.
- Apply the construction and maintenance techniques of tracks and stations.
- Examine planning and site selection for airports.
- Analyze and design the elements for orientation of runways and passenger facility systems.
- Construct the features of harbors, ports, and coastal protection works.

TEXT BOOKS

1. Khanna S K, Arora M G and Jain S S, "Airport Planning and Design", Nemchand and Brothers, Sixth Edition, Roorkee, 2015.
2. Bindra S P, "A Course in Docks and Harbour Engineering", Dhanpat Rai and Sons, New Delhi, Fifth Edition, 2015.
3. A. D. Quinn, "Design and Construction of Port and Marine Structures", McGraw-Hill Book Company, Second Edition, 1972.

REFERENCES

1. Bruun, Per "Port engineering: Vol. 1. Harbor planning, breakwaters, and marine terminals", Gulf Publishing Company, Fourth Edition, 1989.
2. J. W. Gaythwaite, Van Nostrand, "Design of Marine Facilities for the Berthing, Mooring and Repair of Vessels", 1990.
3. Muir Wood, A.M., and Fleming. C.A., "Coastal Hydraulics Sea and Inland Port Structures", First Edition, Hallstead Press, 2002.

E-RESOURCES

1. <https://nptel.ac.in/courses/114/106/114106025/> (Port and Harbour Structures)
2. <https://nptel.ac.in/courses/105/107/105107123/> (Transportation Engineering II)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	-	-	-	-	-	-	2	-	-	2
2	3	2	2	-	-	2	-	-	-	-	-	-	2
3	3	3	2	-	-	2	2	-	-	2	-	-	3
4	3	3	3	3	-	2	-	-	-	-	-	-	2
5	3	2	-	-	-	2	3	-	-	2	-	-	2
AVG.	3	2.4	2.3	3	-	2	2.5	-	-	2	-	-	2.2

1-Low 2-Medium 3-High '-' – No Correlation.

[Signature]
Chairman - BoS





23CEP612

COASTAL HAZARDS AND MITIGATION

L T P C

3 0 0 3

OBJECTIVES

- To inculcate the introduction of environmental and human induced hazards.
- To acquire knowledge on the natural hazards and other coastal hazards.
- To familiarize with the disaster management law and policy.
- To enhance the coastal hazards adaptation strategy.
- To foster the case studies of tsunami, earthquakes, cyclones

UNIT I INTRODUCTION

9

Introduction to Environmental and Human induced hazards - Natural vs. Man-made hazard Hazard and disaster, vulnerability, resilience - coping mechanisms

UNIT II COASTAL HAZARDS

9

Coastal hazards- Tsunami, Cyclones, Earthquakes, Storm surges, Coastal erosion, Floods, Sea Level Rise—Technological Hazards – causes – impacts – responses – mitigation strategies - early warning systems

UNIT III LAW AND POLICY

9

Disaster management law and policy in India – changing pattern of disaster management in India – response and recovery framework - enabling institutions— institutional coordination

UNIT IV ADAPTATION AND MITIGATION

9

Coastal Hazards Adaptation Strategy - Adaptation indigenous knowledge - Sectoral adaptations - Disaster risk response frameworks - Mapping and planning for disaster -Community based disaster Mitigation Measures — Indigenous knowledge for disaster Mitigation - NDMA guidelines.

UNIT V CASE STUDIES

9

Case studies of tsunami (2004 Indian Ocean tsunami), Earthquake (Latur), cyclones (Gaja, 2018 Tamilnadu), other cyclones, coastal erosion, oil spills, chemical disasters, nuclear disasters — vulnerability of coastal megacities - lessons from building back better.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Inspect the concepts of hazards and their related physical process
- Analyze the concepts of natural and manmade hazards.
- Build the adaptation strategy and mitigation measure to coastal hazards
- Classify the various laws and policies involved in - institutional coordination of India.
- Examine the hazards based on case studies and respond in the event of a disaster by appropriate strategies.

TEXT BOOKS

1. Bryant, E., "Natural Hazards", Cambridge University Press, New York, 2006.
2. Rajib Shaw and RR Krishnamurthy, "Disaster Management: Global Challenges Local Solutions", University Press, 2009.
3. National Disaster Management Agency – Guidelines issued by NDMA for earthquakes, tsunamis, cyclones and chemical disasters.

REFERENCES

1. Kapucu, N., Hawkins, C. and Rivera, F.I., "Disaster Resiliency: Interdisciplinary Perspectives", Routledge, Third Edition, 2022.
2. Zutshi, B., Ahmad, A. & Srungarapati, A.B., "Disaster Risk Reduction: Community Resilience and Responses", Palgrave Macmillan, 2019.
3. Haddow, G., Bullock, J.A. & Haddow, K., "Global Warming, Natural Hazards, and Emergency Management", Routledge, 2008.

E-RESOURCES

1. https://www.nj.gov/dep/cmp/coastal_hazard_manual.pdf (Coastal Hazard Mitigation)
2. https://incois.gov.in/documents/ITCOcean/coastal%20vulnerabilityf_introduction.pdf (Introduction to Coastal Vulnerability)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	-	-	-	-	-	-	-	-	-	-	-	-
2	3	-	2	2	-	-	-	2	-	3	-	-	3
3	3	3	3	3	3	2	-	2	2	3	2	3	2
4	3	2	-	2	-	2	2	-	2	3	2	3	2
5	3	3	3	3	2	2	2	3	-	3	2	3	3
AVG.	3	2.7	2.7	2.5	2.5	2	2	2.3	2	3	2	3	2.5

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PROFESSIONAL ELECTIVE -VI GEO-ENVIRONMENTAL ENGINEERING

23CEP613

L T P C
3 0 0 3

OBJECTIVES

- To familiarize with the role of geo-environmental engineering.
- To inculcate the transport of contaminant in subsurface.
- To foster the waste containment and remediation of contaminated sites.
- To acquire knowledge on landfill systems, design components, and environmental regulations.
- To enhance the properties of various waste materials for stabilization and reuse.

UNIT I SOIL – WASTE INTERACTION

9

Role of Geo-environmental Engineering – sources, generation and classification of wastes – causes and consequences of soil pollution – case studies in soil failure -factors influencing soil pollutant interaction – modification of index, chemical and engineering properties – physical and physio-chemical mechanisms.

UNIT II CONTAMINANT TRANSPORT AND SITE CHARACTERISATION

9

Transport of contaminant in subsurface – advection, diffusion, dispersion – chemical process – biological process, sorption, desorption, precipitation, dissolution, oxidation, complexation, ion exchange, volatilization, biodegradation – characterization of contaminated sites – soil and rock data – hydrological and chemical data – analysis and evaluation.

UNIT III WASTE CONTAINMENT AND REMEDIATION OF CONTAMINATED SITES

9

In-situ containment – vertical and horizontal barrier – surface cover – ground water pumping system on subsurface drain – soil remediation – soil vapour extraction, soil waste stabilization, solidification of soils, electrokinetic remediation, soil heating, vitrification, bio remediation, phyto-remediation – ground water remediation – pump and treat , In-situ flushing, permeable reacting barrier, In-situ air sparging.

UNIT IV LANDFILLS AND SURFACE IMPOUNDMENTS

9

System – Source and characteristics of waste - site selection for landfills – components of landfills – liner soil, geomembrane, geosynthetic clay, geo-composite liner system – leachate collection – final cover design – monitoring landfill - environmental laws and regulations.

UNIT V STABILISATION OF WASTE

9

Evaluation of waste materials – flyash, municipal sludge, plastics, scrap tire, blast furnace slag, construction waste, wood waste and their physical, chemical and biological characteristics – potential reuse – utilization of waste and soil stabilization.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Classify the soil-waste interaction and causes of soil pollution.
- Apply contaminant transport principles for site characterization.
- Analyze and design waste containment and remediation methods.
- Build the landfill systems and environmental regulations.
- Evaluate waste materials for stabilization and reuse.





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TEXT BOOKS

1. Daniel B.E, "Geotechnical Practice for waste disposal, Chapman & Hall", London, 1993.
2. Hari D. Sharma and Krishna R.Reddy, "Geo-Environmental Engineering", John Wiley and Sons, INC, USA, 2004.
3. Westlake, K., "Landfill Waste pollution and Control", Albion Publishing Ltd., England, 1995.

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1. Wentz, C.A., "Hazardous Waste Management", McGraw Hill, Singapore, 1989.
2. Lagrega, M.d., Buckingham, P.L., and Evans, J.C., "Hazardous Waste Management", McGraw Hill, Singapore, 1994.
3. Johnson, A. I., Frobel, R. K., Cavalli, N. J., & Pettersson, C. B., "Hydraulic Barrier in Soil and Rock", ASTM Special Technical Publication 874, 1985.

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1. <https://nptel.ac.in/courses/105/103/105103026/>(Ground Water Hydrology)
2. <https://nptel.ac.in/courses/105/105/105105042/>(Ground Water Hydrology)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	1	1	2	2	1	2	1	1	3	2
2	3	2	2	1	1	2	2	1	2	1	2	3	2
3	3	3	3	3	3	3	2	2	2	2	2	3	3
4	3	3	3	3	3	3	2	2	2	2	2	3	3
5	3	2	1	1	2	2	2	1	2	1	1	3	2
AVG.	3	2.4	2.2	1.8	2.0	2.4	2.0	1.4	2.0	1.4	1.6	3	2.4

1-Low 2-Medium 3-High '-' – No Correlation.

Chairman - BoS





23CEP614

GROUND IMPROVEMENT TECHNIQUES

L T P C
3 0 0 3

OBJECTIVES

- To enhance the ability to resolve problems associated with different soil deposits.
- To impart fundamental knowledge on various dewatering techniques and perform seepage analysis for designing simple dewatering systems.
- To inculcate the insitu treatment of cohesionless and cohesive soils.
- To familiarize with earth reinforcement methods.
- To acquire the skills required to carry out grouting procedures.

UNIT I PROBLEMATIC SOIL AND IMPROVEMENT TECHNIQUES

9

Role of ground improvement in foundation engineering – Methods of ground improvement – Geotechnical problems in alluvial, lateritic and black cotton soils – Selection of suitable ground improvement techniques based on soil conditions.

UNIT II DEWATERING

9

Dewatering Techniques – Well points – Vacuum and electro osmotic methods – Seepage analysis for two dimensional flows for fully and partially penetrated slots in homogeneous deposits – Design for simple cases.

UNIT III INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS

9

Insitu densification of cohesionless soils – Shallow as deep compaction – Dynamic compaction – Vibroflotation, Sand compaction piles and deep compaction. Consolidation of cohesive soils. – Preloading with sand drains, and fabric drains, Stabilization of soft clay ground using stone columns and Lime piles – Installation techniques – Simple design – Relative merits of above methods and their limitations.

UNIT IV EARTH REINFORCEMENT

9

Concept of reinforcement – Types of reinforcement material – Reinforced earth wall – Mechanism – Simple design – Applications of reinforced earth; Functions of Geotextiles in filtration, drainage, separation, road works and containment applications – Natural Fibres.

UNIT V GROUTING TECHNIQUES

9

Types of grouts – Grouting equipments and machinery – Injection methods – Grout monitoring – Stabilization with cement, lime and chemicals – Stabilization of expansive soil.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the methods and selection of ground improvement techniques.
- Inspect the dewatering methods and their design applications.
- Examine the in-situ treatment of cohesion less and cohesive soils.
- Apply the earth reinforcement principles and reinforced earth design.
- Build the correct type of grout and technique for application.

TEXT BOOKS

1. Purushothama Raj. P, "Ground Improvement Techniques", Lakshmi Publications, Second Edition, 2016.
2. Mittal.S, "An Introduction to Ground Improvement Engineering", Medtech Publisher, First Edition, 2015.
3. M. N. Islam, "Ground Improvement and Soil Stabilization", McGraw-Hill Education, First Edition, 2020.

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1. Coduto, D.P., "Geotechnical Engineering – Principles and Practices", Prentice Hall of India Pvt.Ltd. New Delhi, 2015.
2. Koerner, R.M., "Designing with Geosynthetics", Xlibris Corporation, Sixth Edition, U.S.A, 2015.
3. Smart Cities, "Fundamentals of Ground Improvement Engineering", CRC Press, First Edition, 2022.

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1. [https://nptel.ac.in/courses/105/108/105108075/\(Ground Improvement Techniques\)](https://nptel.ac.in/courses/105/108/105108075/(Ground%20Improvement%20Techniques))
2. [https://nptel.ac.in/courses/105/106/105106144/\(Advanced Techniques in Geotechnical and Foundation Engineering\)](https://nptel.ac.in/courses/105/106/105106144/(Advanced%20Techniques%20in%20Geotechnical%20and%20Foundation%20Engineering))

Mapping of COs-POs & PSOs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	1	–	2	–	–	1	1	2	3	2
2	3	3	2	2	–	2	–	–	1	1	2	3	2
3	3	3	2	2	–	2	–	–	1	1	2	3	2
4	3	2	3	2	–	2	–	–	1	1	2	3	3
5	3	2	2	1	–	2	–	–	1	1	2	3	2
AVG.	3	2.4	2.2	1.6	–	2	–	–	1	1	2	3	2.2

1-Low 2-Medium 3-High '-' – No Correlation

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23CEP615

PILE FOUNDATION

L T P C
3 0 0 3

OBJECTIVES

- To familiarize with the necessity of pile foundations and different types of piles.
- To enhance the methods for determining the allowable load on single piles and pile groups.
- To acquire knowledge on the behavior of piles under lateral and uplift loads.
- To foster the structural design of piles, pile cap connections and reinforcement detailing.
- To inculcate the types, stability, and structural design of caissons.

UNIT I PILE CLASSIFICATIONS AND LOAD TRANSFER PRINCIPLE

9

Necessity of pile foundation – classification of piles – Factors governing choice of type of pile – Load transfer mechanism – piling equipments and methods – effect of pile installation on soil condition – pile raft system – basic interactive analysis - criteria for pile socketing.

UNIT II AXIAL LOAD CAPACITY OF PILES AND PILE GROUPS

9

Allowable load of piles and pile groups – Static and dynamic methods – for cohesive and cohesionless soil – negative skin friction – group efficiency – pile driving formulae - limitation – Wave equation application – evaluation of axial load capacity from field test results - Settlement of piles and pile group.

UNIT III LATERAL AND UPLIFT LOAD CAPACITIES OF PILES

9

Piles under Lateral loads – Broms method, elastic, p-y curve analyses – Batter piles – response to moment – piles under uplift loads – under reamed piles – Drilled shaft – Lateral and pull out capacity from load test.

UNIT IV STRUCTURAL DESIGN OF PILE AND PILE GROUPS

9

Structural design of pile – structural capacity – pile and pile cap connection – pile cap design – shape, depth, assessment and amount of steel – truss and bending theory- Reinforcement details of pile and pile caps — pile subjected to vibration.

UNIT V CAISSONS

9

Necessity of caisson – type and shape - Stability of caissons – principles of analysis and design – tilting of caisson – construction - seismic influences.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Examine the importance of pile foundation and various functions.
- Develop the vertical load carrying capacity of piles.
- Analyze the lateral and uplift load capacities of piles.
- Design the pile and pile caps, considering the wind and seismic loads.
- Construct the importance of caisson foundation and checking the stability of caissons.





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TEXT BOOKS

1. Das, B.M., "Principles of Foundation Engineering, Design and Construction", Fourth Edition, PWS Publishing, 1999.
2. Poulos, H.G., Davis, E.H., "Pile foundation analysis and design", John Wiley and Sons, New York, 1980.
3. Tomlinson, M.J. "Foundation engineering", ELBS, Longman Group, U.K. Ltd., England 1995.

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1. Michael Tomlinson and John Woodward, "Pile design and construction practice", Taylor & Francis Group, London & New York, 2008.
2. Cernica, J.N. "Geotechnical Engineering Foundation Design", John Wiley and Sons, Inc. 1995.
3. Bowles, J.E., "Foundation Analysis and Design", Fifth Edition, McGraw Hill, New York, 1996.

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1. [https://nptel.ac.in/courses/105/105/105105105/\(Foundation Engineering\)](https://nptel.ac.in/courses/105/105/105105105/(Foundation%20Engineering))
2. [https://nptel.ac.in/courses/105/105/105105039/\(Advanced Foundation Engineering\)](https://nptel.ac.in/courses/105/105/105105039/(Advanced%20Foundation%20Engineering))

Mapping of COs-POs & PSOs

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3	3	3	3	3	-	2	1	1	1	1	2	2	3
4	3	3	3	3	-	1	1	1	1	1	2	2	3
5	3	3	3	3	-	2	1	1	1	1	2	2	3
AVG.	3	3	3	3	-	1.8	1.2	1	1	1	1.6	2.2	2.8

1-Low 2-Medium 3-High '-' – No Correlation


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23CEP616

SOIL DYNAMICS AND MACHINE FOUNDATIONS

L T P C

3 0 0 3

OBJECTIVES

- To inculcate the basic concepts of vibration theory.
- To impart knowledge on the dynamic stress-strain characteristics, laboratory and field testing techniques.
- To foster the different types of machine foundations, design requirements, vibration analysis using elastic half-space theory.
- To familiarize with the block-type and framed-type machine foundations.
- To acquire knowledge on the various vibration isolation methods.

UNIT I THEORY OF VIBRATION

9

Introduction – Nature of dynamic loads – Basic definitions – Simple harmonic motion – Fundamentals of vibration – Single degree and multi degree of freedom systems – Free vibrations of spring – Mass systems – Forced vibrations – Resonance – Viscous damping – Principles of vibrations measuring systems – Effect of transient and pulsating loads.

UNIT II DYNAMIC SOIL PROPERTIES

9

Dynamic stress-strain characteristics – Principles of measuring dynamic properties – Laboratory techniques – Field tests – Block vibration test – Factors affecting dynamic properties – Typical values. Mechanism of liquefaction – Influencing factors – Evaluation of liquefaction potential – Analysis from SPT test – Dynamic bearing capacity – Dynamic earth pressure.

UNIT III MACHINE FOUNDATIONS

9

Introduction – Types of machine foundations – General requirements for design of machine foundations – Design approach for machine foundation – Vibration analysis – Elastic Half-Space theory – Mass-spring-dashpot model – Permissible amplitudes – Permissible bearing pressures.

UNIT IV DESIGN OF MACHINE FOUNDATION

9

Evaluation of design parameters – Types of Machines and foundations – General requirements – their importance – Analysis and design of block type and framed type machine foundations – Modes.

UNIT V VIBRATION ISOLATION

9

Vibration isolation – Types of isolation – Transmissibility – Passive and active isolation – Methods of isolation – Use of springs and damping materials – Properties of isolating materials – Vibration control of existing machine foundation.

TOTAL:45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the theories of vibration to solve dynamic soil problems.
- Apply the dynamic properties of soil using laboratory and field tests.
- Examine the machine foundations and design various types of machine foundation.
- Construct the capable of selecting the types of vibration isolation materials.
- Analyze the vibration isolation techniques for various field problems.





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1. Kameswara Rao, N.S.V., "Dynamics soil tests and applications", Wheeler Publishing, New Delhi, 2000.
2. Prakash, S and Puri, V.K., "Foundations for machines", McGraw Hill, 1987.
3. Moore, P.J., "Analysis and Design of Foundations for Vibrations", Oxford and IBH, 1985.

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1. Vaidyanathan, C.V., and Srinivasalu, P., "Handbook of Machine Foundations", McGraw Hill, 1995.
2. Arya, S., O'Nelt, S., "Design of Structures and Foundations for Vibrating Machines", Prentice Hall, 1981.
3. Major, A., "Vibration Analysis and Design of Foundations for Machines and Turbines", Vol. I, II and III Budapest, 1964.

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1. [https://nptel.ac.in/courses/105/101/105101084/\(Soil Mechanics\)](https://nptel.ac.in/courses/105/101/105101084/(Soil%20Mechanics))
2. [http://www.nptelvideos.in/2012/11/soil-mechanics.html\(Soil Mechanics\)](http://www.nptelvideos.in/2012/11/soil-mechanics.html(Soil%20Mechanics))

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
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3	3	3	3	3	-	2	1	1	1	1	2	2	3
4	3	3	3	3	-	1	1	1	1	1	2	2	3
5	3	3	3	3	-	2	1	1	1	1	2	2	3
AVG.	3	3	3	3	-	1.8	1.2	1	1	1	1.6	2.2	2.8

1-Low 2-Medium 3-High '-' – No Correlation


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23CEP617

ROCK MECHANICS

L T P C
3 0 0 3

OBJECTIVES

- To inculcate the different types of rocks and their index properties.
- To familiarize with the rock under hydrostatic compression and deviatoric loading.
- To impart knowledge on in-situ stresses and their measurements.
- To enhance the role of discontinuities in slope failure and slope stability analysis.
- To foster the rock reinforcement methods.

UNIT I CLASSIFICATION OF ROCKS

9

Types of Rocks - Index properties and classification of rock masses, competent and incompetent rock - value of RMR and ratings in field estimations.

UNIT II STRENGTH CRITERIA OF ROCKS

9

Behaviour of rock under hydrostatic compression and deviatoric loading - Modes of rock failure planes of weakness and joint characteristics - joint testing, Mohr - Coulomb failure criterion and tension cut-off. Hoek and Brown Strength criteria for rocks with discontinuity sets.

UNIT III INSITU STRESSES IN ROCKS

9

In-situ stresses and their measurements, Hydraulic fracturing, flat jack, over coring and under coring methods - stress around underground excavations – Design aspects of openings in rocks.

UNIT IV SLOPE STABILITY AND BEARING CAPACITY OF ROCKS

9

Rock slopes - role of discontinuities in slope failure, slope analysis and factor of safety - remedial measures for critical slopes – Bearing capacity of foundations on rocks.

UNIT V ROCK STABILIZATION

9

Stabilization of rocks-rock support and rock reinforcement-active and passive supports-ground response curve-support reaction curve-reinforcement of fractured and jointed rocks-Shotcreting-bolting-anchoring-installation methods.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Classify rocks and evaluate rock mass properties using RMR.
- Analyze rock strength and failure using strength criteria.
- Apply in-situ stress measurement methods for rock engineering design.
- Examine the stability of rock slopes and bearing capacity of foundations.
- Select the appropriate rock stabilization and support systems.





TEXT BOOKS

1. Goodman, R.E., "Introduction to rock mechanics", John Willey and Sons, 1989.
2. Hudson, A. and Harrison, P., "Engineering Rock mechanics – An introduction to the principles", Pergamon publications, 1997.
3. Hoek, E and Bray, J., "Rock slope Engineering, Institute of Mining and Metallurgy", U.K. 1981.

REFERENCES

1. Obvert, L. and Duvall, W., "Rock Mechanics and the Design of structures in Rock", John Wiley, 1967.
2. Bazant, Z.P., "Mechanics of Geomaterials Rocks, Concrete and Soil ", John Wiley and Sons, Chichester, 1985.
3. Waltham, T., "Foundations of Engineering Geology", Second Edition, Spon Press, Taylor & Francis Group, London and New York, 2002.

E-RESOURCES

1. [https://nptel.ac.in/courses/105/105/105105106/\(Engineering Geology\)](https://nptel.ac.in/courses/105/105/105105106/(Engineering%20Geology))
2. [https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ce47/\(Structural Geology\)](https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ce47/(Structural%20Geology))

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	3	-	2	1	1	1	1	2	3	2
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3	3	3	3	3	-	2	1	1	1	1	2	2	3
4	3	3	3	3	-	1	1	1	1	1	2	2	3
5	3	3	3	3	-	2	1	1	1	1	2	2	3
AVG.	3	3	3	3	-	1.8	1.2	1	1	1	2	2.2	2.8

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS





23CEP618

EARTH AND EARTH RETAINING STRUCTURES

**LT P C
3 0 0 3**

OBJECTIVES

- To inculcate the stress distribution in retained soils and classical earth pressure theories.
- To instruct the effects of compaction, drainage, wall flexibility, and seismic forces on earth pressure.
- To enhance the analysis and design of cantilever and anchored sheet pile walls.
- To familiarize with the earth pressures in braced excavations, tunnels, shafts, and silos.
- To develop knowledge on slurry-supported excavations and diaphragm wall design.

UNIT I EARTH PRESSURE THEORIES

9

Introduction – State of stress in retained soil mass – Earth pressure theories – Classical and graphical techniques (Culmann's method) – Active and passive cases – Earth pressure due to external loads.

UNIT II COMPACTION, DRAINAGE AND STABILITY OF RETAINING STRUCTURES

9

Retaining structure – Selection of soil parameters - Lateral pressure due to compaction, strain softening, wall flexibility, drainage arrangements and its influence. – Stability analysis of retaining structure both for regular and earthquake forces.

UNIT III SHEET PILE WALLS

9

Types of sheet piles - Analysis and design of cantilever and anchored sheet pile walls – free earth support method – fixed earth support method. Design of anchor systems - isolated and continuous.

UNIT IV SUPPORTED EXCAVATIONS

9

Lateral pressure on sheeting in braced excavation, stability against piping and bottom heaving. Earth pressure around tunnel lining, shaft and silos – Soil anchors – Soil pinning – Basic design concepts.

UNIT V SLURRY SUPPORTED EXCAVATION

9

Slurry supported trenches-basic principles-slurry characteristics-specifications-diaphragm walls-bored pile walls-contiguous pile wall-secant piles-stability analysis.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze earth pressures on retaining structures using classical theories.
- Design rigid retaining structures under static and seismic conditions.
- Design flexible retaining systems such as sheet pile walls.
- Analyze and design braced and slurry-supported excavations.
- Evaluate stability of diaphragm walls and slurry-supported systems.





TEXT BOOKS

1. Clayton, C.R.I., Militisky, J. and Woods, R.I., Earth pressure and Earth-Retaining structures, Second Edition, Survey University Press, 1993.
2. Das, B.M., Principles of Geotechnical Engineering, Fourth Edition, The PWS series in Civil Engineering, 1998.
3. Militisky, J. and Woods, R., Earth and Earth retaining structures, Routledge, 1992.

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1. Winterkorn, H.F. and Fang, H.Y., Foundation Engineering Handbook, Galgotia Book source, 2000.
2. Rowe, R.K., Geotechnical and Geoenvironmental Engineering Handbook, Kluwer Academic Publishers, 2001.
3. Koerner, R.M. Designing with Geosynthetics, Third Edition, Prentice Hall, 1997.

E-RESOURCES

1. [https://nptel.ac.in/courses/105/105/105105106/\(Engineering Geology\)](https://nptel.ac.in/courses/105/105/105105106/(Engineering%20Geology))
2. [https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ce47/\(Structural Geology\)](https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ce47/(Structural%20Geology))

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5	3	3	3	3	-	2	1	1	1	1	2	2	3
AVG.	3	3	3	3	-	1.8	1.2	1	1	1	1.6	2	3

1-Low 2-Medium 3-High '-' – No Correlation

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23CE0607

OPEN ELECTIVE - I
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

LT P C
3 0 0 3

OBJECTIVES

- To explore the Rio principles of environmental impact assessment.
- To enhance the screening and scoping in EIA.
- To develop the environmental monitoring plan and EIA report preparation.
- To inculcate the baseline monitoring of socio economic environment.
- To instruct the EIA case studies pertaining to infrastructure projects.

UNIT I INTRODUCTION

9

Impacts of Development on Environment – Rio Principles of Sustainable Development- Environmental Impact Assessment (EIA) – Objectives – Historical development – EIA Types – EIA in project cycle –EIA Notification and Legal Framework.

UNIT II ENVIRONMENTAL ASSESSMENT

9

Screening and Scoping in EIA – Drafting of Terms of Reference, Baseline monitoring, Prediction and Assessment of Impact on land, water, air, noise, flora and fauna - Matrices – Networks Checklist Methods - Mathematical models for Impact prediction.

UNIT III ENVIRONMENTAL MANAGEMENT PLAN

9

Plan for mitigation of adverse impact on water, air and land, water, energy, flora and fauna – Environmental Monitoring Plan – EIA Report Preparation – Public Hearing- Environmental Clearance.

UNIT IV SOCIO ECONOMIC ASSESSMENT

9

Baseline monitoring of Socio economic environment – Identification of Project Affected Personal – Rehabilitation and Resettlement Plan- Economic valuation of Environmental impacts – Cost benefit Analysis.

UNIT V CASE STUDIES

9

EIA case studies pertaining to Infrastructure Projects – Roads and Bridges – Mass Rapid Transport Systems- Airports - Dams and Irrigation projects - Power plants.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Examine the impacts of development on environment.
- Analyze the scoping and screening of developmental projects for environmental and social assessments.
- Construct the environmental management plans and EIA reports.
- Apply the economic valuation of environmental impacts and cost benefit analysis.
- Identify the EIA case studies pertaining to Infrastructure Projects.





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TEXT BOOKS

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2. Lohani, B., J.W. Evans, H. Ludwig, R.R. Everitt, Richard A. Carpenter, and S.L. Tu, "Environmental Impact Assessment for Developing Countries in Asia", Volume 1 – Overview, Asian Development Bank, 1997.
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1. Becker H. A., Frank Vanclay, "The International handbook of social impact assessment" Conceptual and Methodological Advances, Edward Elgar Publishing, 2003.
2. Barry Sadler and Mary McCabe, "Environmental Impact Assessment Training Resource Manual", United Nations Environment Programme, 2002.
3. Judith Petts, "Handbook of Environmental Impact Assessment Vol. I and II", Blackwell Science New York, 1998.

E-RESOURCES

1. <https://nptel.ac.in/courses/124107160> - (Environmental Impact Assessment)
2. https://onlinecourses.nptel.ac.in/noc25_ch24/preview - (Environmental Quality Monitoring & Analysis)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
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AVG.	3	3	2.4	2	2	2.2	3	-	-	-	2.3	-	-

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23CSO610

INTRODUCTION TO DRONE TECHNOLOGIES

L T P C
3 0 0 3

OBJECTIVES

- To impart fundamental knowledge of drone technology, including its concepts, terminology, historical evolution, and emerging applications.
- To develop students' understanding of UAV architecture, drone components, fabrication techniques, and programming methodologies.
- To train students in drone flight operations, navigation systems, sensors, data acquisition, and UAV management tools.
- To enable students to explore commercial applications of drones in sectors such as agriculture, logistics, inspection, surveillance, and aerial imaging.
- To familiarize students with drone safety regulations, licensing requirements, and emerging technologies including autonomous and swarm-based UAV systems.

UNIT I INTRODUCTION TO DRONE TECHNOLOGY

9

Drone Concept-Vocabulary Terminology-History of drone-Types of current generation of drones based on their method of propulsion- Drone technology impact on the businesses-Drone business through entrepreneurship-Opportunities/applications for entrepreneurship and Employability.

UNIT II DRONE DESIGN, FABRICATION AND PROGRAMMING

9

Classifications of the UAV -Overview of the main drone parts- Technical characteristics of the parts -Function of the component parts -Assembling a drone- The energy sources- Level of autonomy- Drones configurations -The methods of programming drone- Download program – Install program on computer-Running Programs-Multi rotor stabilization-Flight modes-Wi-Fi connection.

UNIT III DRONE FLYING AND OPERATION

9

Concept of operation for drone -Flight modes- Operate a small drone in a controlled environment- Drone controls Flight operations –management tool –Sensors-Onboard storage capacity-Removable storage devices-Linked mobile devices and applications.

UNIT IV DRONE COMMERCIAL APPLICATIONS

9

Choosing a drone based on the application-Drones in the insurance sector-Drones in delivering mail, parcels and other cargo-Drones in agriculture-Drones in inspection of transmission lines and power distribution -Drones in filming and panoramic picturing.

UNIT V FUTURE DRONES AND SAFETY

9

The safety risks-Guidelines to fly safely –Specific aviation regulation and standardization-Drone License-Miniaturization of drones-Increasing autonomy of drones-The use of drones in swarms.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Explain the fundamental concepts, terminology, classifications, history, and applications of drone technology.
- Design a multirotor drone by selecting appropriate hardware appropriate components and tools.
- Apply flight control principles, navigation methods, onboard sensors, and UAV management tools for drone flight operations.
- Analyze the drone technologies for commercial applications such as aerial imaging, agriculture, logistics, infrastructure inspection, and surveillance
- Analyze drone safety regulations, licensing requirements, and emerging technologies including autonomous drones and swarm intelligence for future UAV applications.

TEXTBOOKS

1. Daniel Tal and John Altschuld, "Drone Technology in Architecture, Engineering and Construction: A Strategic Guide to Unmanned Aerial Vehicle Operation and Implementation", John Wiley & Sons, First Edition, 2021.
2. Terry Kilby and Belinda Kilby, "Make: Getting Started with Drones, Maker Media, Inc.", Sheroff Publishers and Distributors Pvt Ltd, First Edition, 2015.

REFERENCES

1. John Baichtal, "Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs", Que Publishing, First Edition, 2016.
2. Zavrnsnik, "Drones and Unmanned Aerial Systems: Legal and Social Implications for Security and Surveillance", Springer, First Edition, 2018.

E-RESOURCES

1. <http://www.digimat.in/nptel/courses/video/101108661/L50.html> (Fundamentals of Drone Technologies)
2. <http://www.digimat.in/nptel/courses/video/101108661/L38.html> (Drone Technology Commercial Application)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	1	3	-	-	-	-	-	3	-	-
2	3	3	3	2	3	-	-	-	-	-	3	-	-
3	3	3	2	2	3	-	-	-	-	-	3	-	-
4	2	3	2	2	3	-	-	1	-	-	2	-	-
5	2	3	3	2	3	-	-	2	-	-	2	-	-
AVG.	2.6	2.8	2.4	1.8	3	-	-	1.5	-	-	2.6	-	-

1-Low, 2-Medium, 3-High, "-" – No Correlation

Chairman - BoS





23ECO602

FUNDAMENTALS OF ELECTRONIC DEVICES AND CIRCUITS

L T P C

3 0 0 3

OBJECTIVES

- To introduce fundamental knowledge of semiconductors and devices and its applications.
- To discuss the operation and characteristics of Bipolar Junction Transistor.
- To expose the various types of oscillators and FET.
- To inculcate the operation of power semiconductor devices.
- To impart knowledge on optoelectronic devices and wave shaping circuits.

UNIT I SEMICONDUCTOR AND DIODES

9

Semiconductor - Definition, classification, intrinsic and extrinsic N type & p type – drift current & diffusion current diodes – PN junction diode – forward and reverse bias characteristics – specification – zener diode construction & working Principle - characteristics - zener break down - avalanche break down.

Rectifier – introduction-classification of rectifiers-half wave rectifier-full wave Rectifier (center tapped, bridge) - (no mathematical equations) – comparison – Applications - filters-C, LC and PI filters.

UNIT II BIPOLAR JUNCTION TRANSISTOR

9

Transistor – NPN and PNP transistor – operation-transistor as an amplifier- transistor as a switch – CB, CE, CC configurations – characteristics - comparison between three configurations in terms of input impedance, output impedance, current gain, voltage gain – negative feedback Concept, effect of negative feedback – types of negative feedback connections.

UNIT III TRANSISTOR OSCILLATORS AND FET

9

Transistor oscillators – Classifications – Condition for oscillations (Barkhausen criterion) – General form of Hartley Oscillator – Colpitts Oscillator – RC Phase shift oscillator.

Field Effect Transistor – construction – working principle of FET – difference Between FET and BJT – classification of FET – characteristics of FET – Applications.

UNIT IV SCR, DIAC, TRIAC

9

SCR – introduction – working – VI-characteristics -comparison between SCR and transistor – SCR as a switch, controlled rectifier. TRIAC working principle, Characteristics –DIAC –characteristics –DIAC as bi- directional switch. Applications of SCR, TRIAC and DIAC.

UNIT V OPTOELECTRONIC DEVICES AND WAVE SHAPING CIRCUITS

9

Classification of optoelectronic devices – symbols, Characteristics, working of LDR, LED, 7 segment LED and LCD– opto coupler - Photo transistor. Clipper, Clamper Circuits and waveforms only – Astable, Monostable Multivibrators and Schmitt trigger using transistors.

TOTAL : 45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Understand the concept of semiconductor, diodes and its applications.
- Discuss the various biasing circuits using BJT.
- Explain the oscillator circuits and Field Effect Transistor.
- Analyze the operation of power semiconductor devices and its applications.
- Explain the operation of optoelectronic devices and wave shaping circuits.

TEXT BOOKS

1. Robert L. Boylestad, Louis Nashelsky "Electronic Devices and Circuits Theory", Prentice Hall Publications, Tenth Edition, 2009.
2. S.Salivahanan, N.Suresh kumar, , "Electronic Devices and Circuits", McGraw Hill, Fifth Edition, 2022.

REFERENCES

1. G.S.N. Raju, "Electronic Devices and Circuits", I.K. International Publications, New Delhi, First Edition, 2006
2. A.P Godse, U.A Bakshi, "Electronic Devices and Circuits", Technical Publications, 2010.

E-RESOURCES

1. <https://nptel.ac.in/courses/108108122> - (Fundamentals of Semiconductor Devices).
2. https://onlinecourses.nptel.ac.in/noc21_ee86 - (Microelectronics: Devices To Circuits).

Mapping of COs - POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	3	3	2	-	-	-	-	3	-	-
2	3	3	3	3	2	3	-	-	-	-	2	-	-
3	3	3	3	3	3	2	-	-	-	-	3	-	-
4	3	3	3	3	3	2	-	-	-	-	2	-	-
5	3	3	3	3	3	3	-	-	-	-	2	-	-
AVG.	3	3	3	3	2.8	2.4	-	-	-	-	2.4	-	-

1- Low, 2 - Medium, 3 - High, '-' – No correlation

Chairman - BoS





23EEO603

ELECTRIC VEHICLE TECHNOLOGY

L T P C
3 0 0 3

OBJECTIVES

- To impart knowledge on the basic concepts and working of electric vehicles.
- To familiarize with battery types, parameters, and battery pack design for electric vehicles.
- To instruct on DC and AC electrical machines used in electric vehicle applications.
- To develop understanding of electric vehicle drive train components and regenerative braking.
- To foster awareness of hybrid electric vehicle types, configurations, and component sizing.

UNIT I ELECTRIC VEHICLES

9

Introduction - Components - Vehicle mechanics - Roadway fundamentals - Vehicle kinetics
Dynamics of vehicle motion Propulsion System Design

UNIT II BATTERY

9

Basics - Types - Parameters Capacity, Discharge rate, State of charge, state of discharge,
Depth of discharge - Technical characteristics - Battery pack design Properties of batteries

UNIT III DC & AC ELECTRICAL MACHINES

9

Motor and engine rating - Requirements - DC machines - Three phase AC machines- Induction machines - Permanent magnet machines - BLDC Motor Switched reluctance machines

UNIT IV ELECTRIC VEHICLE DRIVE TRAIN

9

Transmission configuration - Components - Gears - Differential - Clutch - Brakes
Regenerative braking - Motor sizing

UNIT V HYBRID ELECTRIC VEHICLES

9

Types - Series - Parallel and series - Parallel configuration - Design - Drive train Sizing of components.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the basic concepts and working of electric vehicles.
- Apply the battery types, parameters in battery pack design.
- Explain the DC and AC electrical machines used in electric vehicles.
- Identify the electric vehicle drive train components and regenerative braking.
- Examine the hybrid electric vehicle types, configurations, and component sizing.





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TEXT BOOKS

1. C. Mi, M. A. Masrur and D. W. Gao, "Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives", John Wiley & Sons, Second Edition, 2017.
2. S. Onori, L. Serrao and G. Rizzoni, "Hybrid Electric Vehicles: Energy Management Strategies", Springer, First Edition, 2015.

REFERENCES

1. Iqbal Hussain, "Electric & Hybrid Vehicles - Design Fundamentals", CRC press, Second Edition, 2011.
2. T. Denton, "Electric and Hybrid Vehicles", Routledge, Second Edition, 2020.

E-RESOURCES

1. <https://nptel.ac.in/courses/108103009> - (Hybrids and Electric Vehicle)
2. <http://nptel.ac.in/courses/108103009/> - (Electric Vehicle)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	3	3	-	-	-	-	-	2	-	-
2	3	3	3	3	3	-	-	-	-	-	2	-	-
3	3	3	3	3	3	-	-	-	-	-	2	-	-
4	3	3	3	3	3	-	-	-	-	-	2	-	-
5	3	3	3	3	3	-	-	-	-	-	2	-	-
AVG.	3	3	3	3	3	-	-	-	-	-	2	-	-

1-Low 2-Medium 3-High '-' - No Correlation

Chairman
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23EE0604

RENEWABLE ENERGY SYSTEMS

L T P C
3 0 0 3

OBJECTIVES

- To impart knowledge on renewable energy sources and their role in sustainable energy development.
- To familiarize with the working and applications of wind energy systems.
- To develop understanding of solar photovoltaic and solar thermal energy systems.
- To instruct on biomass, geothermal, and hydroelectric energy systems.
- To get knowledge on other renewable energy sources and energy storage systems.

UNIT I RENEWABLE ENERGY SOURCES

9

Environmental consequences of fossil fuel use - Importance of Renewable Sources (RE) of energy - Sustainable design and development - Types of RE sources - Limitations of RE sources - Present Indian and international energy scenario of conventional and RE sources.

UNIT II WIND ENERGY

9

Power in the wind - Types of wind power plants(wpps) - Components of wpps - Working of wpps - Siting of wpps - Grid integration issues of wpps.

UNIT III SOLAR PV AND THERMAL SYSTEMS

9

Solar radiation - Radiation measurement - Solar thermal power plant - Central receiver power plants - Solar ponds - Thermal energy storage system with pcm - Solar photovoltaic systems - Basic principle of spv conversion - Types of pv systems -Maximum power point tracking - Best free solar pv system simulation.

UNIT IV BIOMASS ENERGY

9

Introduction - Bio mass resources - Energy from bio mass - Conversion processes - Biomass cogeneration - Environmental benefits - Geothermal energy - Basics - Direct use - Geothermal electricity - Mini/micro hydro power - Classification of hydropower schemes - Classification of water turbine - Turbine theory - Essential components of hydroelectric system.

UNIT V OTHER ENERGY SOURCES

9

Tidal energy - Energy from the tides - Barrage and non barrage tidal power systems - Wave energy - Energy from waves - Wave power devices - Ocean thermal energy conversion (OTEC) - Hydrogen production and storage - Fuel cell - Principle of working - Various types - Construction and applications - Energy storage system - Hybrid energy systems.

TOTAL : 45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Explain the importance and types of renewable energy sources.
- Analyze the working and components of wind energy systems.
- Discuss how solar photovoltaic and solar thermal systems work.
- Determine biomass, geothermal, and hydroelectric energy systems.
- Examine tidal, wave, ocean thermal, fuel cell, and hybrid energy systems.

TEXT BOOKS

1. Scott Grinnell, "Renewable Energy & Sustainable Design", Cengage Learning, USA, Second Edition, 2016.
2. Richard A. Dunlap, "Sustainable Energy", Cengage Learning India Private Limited, Second Edition, 2015.

REFERENCES

1. ShobhNath Singh, "Non-conventional Energy resources", Pearson Education India, Second Edition, 2015.
2. Bradley A. Striebig, Adebayo A.Ogundipe and Maria Papadakis, "Engineering Applications in Sustainable Design and Development", Cengage Learning India Private Limited, First Edition, 2016.

E-RESOURCES

1. <https://nptel.ac.in/courses/108/108/108108078/> - (Renewable Energy Systems)
2. <https://nptel.ac.in/courses/108/105/108105058/>-(Non-Conventional Energy resources)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	3	3	1	1	-	1	-	2	-	-
2	3	3	3	3	3	1	1	-	1	-	2	-	-
3	3	3	3	3	3	1	1	-	1	-	2	-	-
4	3	3	3	3	3	1	1	-	1	-	2	-	-
5	3	3	3	3	3	1	1	-	1	-	2	-	-
AVG.	3	3	3	3	3	1	1	-	1	-	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation.

Chairman - BoS





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23MEO601

INTRODUCTION TO INDUSTRIAL ENGINEERING

L T P C

3 0 0 3

OBJECTIVES

- To enable students to grasp the fundamental concepts, scope, and role of Industrial Engineering in manufacturing and service systems.
- To expose students to plant location, facility layout, and production planning concepts relevant to real-world industries.
- To develop analytical ability to apply work study, method study, and ergonomics principles in industrial environments.
- To equip students with foundational knowledge of statistical quality control and its application in process improvement.
- To prepare the concept of Production and Operations Management in creating and enhancing a firm's competitive advantages.

UNIT I INTRODUCTION

9

Concepts of Industrial Engineering – History and development of Industrial Engineering – Roles of Industrial Engineer – Applications of Industrial Engineering – Production Management Vs Industrial Engineering – Production System – Input Output Model – Productivity – Factors affecting Productivity – Increasing Productivity of resources – Kinds of Productivity measures.

UNIT II PLANT LOCATION AND LAYOUT

9

Factors affecting Plant location – Objectives of Plant Layout – Principles of Plant Layout – Types of Plant Layout – Methods of Plant and Facility Layout – Storage Space requirements – Plant Layout procedure – Line Balancing methods.

UNIT III WORK SYSTEM DESIGN & ERGONOMICS

9

Need – Objectives – Method Study procedure – Principles of Motion Economy – Work Measurement procedures – Time Study – Work sampling- Ergonomics and its areas of application in the work system - Physical work load and energy expenditure, Anthropometry – measures – design procedure, Work postures-sitting, standing.

UNIT IV STATISTICAL QUALITY CONTROL

9

Definition and Concepts – Fundamentals – Control Charts for variables – Control Charts for attributes – Acceptance Sampling- O.C curve – Single sampling plan- Double sampling plan.

UNIT V PRODUCTION PLANNING AND CONTROL

9

Forecasting – Techniques – Types of production – Process planning – Economic Batch Quantity– Loading – Scheduling and control of production.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Apply the concepts of productivity and productivity measurement approaches.
- Examine appropriate location models for various facility types and design various facility layouts.
- Analyze and conduct method study and time study to improve the efficiency of the system.
- Examine the quality of processes using control charts in manufacturing/service industries.
- Apply knowledge and skills for planning strategies and preparing a Material Requirement Plan (MRP).

TEXTBOOKS

1. Martand Telsang, 2016, "Industrial Engineering and Production Management", S. Chand and Company.
2. Khanna O. P., and Sarup A., "Industrial Engineering and Management", Dhanpat Rai Publications, New Delhi, 2020,
3. George Kanwaty, "Introduction to Work Study", ILO, Geneva, 2016,

REFERENCES

1. Ravi Shankar, 2019, "Industrial Engineering and Management", Galgotia Publications & Private Limited.
2. Norberd Lloyd Enrick., "Industrial Engineering Manual for Textile Industry", Wiley Eastern (P) Ltd., New Delhi, 2018,
3. Enrick N. L., "Time study manual for Textile industry", Wiley Eastern (P) Ltd., 2019,

E-RESOURCES

1. <https://nptel.ac.in/courses/112107292> (Principles of Industrial Engineering)
2. https://onlinecourses.nptel.ac.in/noc25_me181/preview- (Industrial Engineering and Operations Research)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	-	-	-	-	-	-	-	2	-	-
2	3	3	2	-	-	-	-	-	-	-	2	-	-
3	3	3	2	-	-	-	-	-	-	-	2	-	-
4	3	3	2	-	-	-	-	-	-	-	2	-	-
5	3	3	2	-	-	-	-	-	-	-	2	-	-
AVG.	3	3	2	-	-	-	-	-	-	-	2	-	-

1-Low 2-Medium 3-High '-' -No Correlation

 Chairman - BoS





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23MEO605

TIRUCHENGODE- 637 205
CNC MACHINING TECHNOLOGY

L T P C
3 0 0 3

OBJECTIVES

- To introduce students to the fundamentals of computer graphics, CAD systems, geometric transformations, and viewing techniques used in computer-aided design.
- To provide knowledge on geometric modeling techniques, assembly modeling, graphics standards, and product data exchange standards used in CAD applications.
- To explain the construction, components, control systems, and operational features of CNC machines and advanced machining centres.
- To familiarize students with manual and computer-aided CNC part programming techniques using APT, CAM packages, and canned cycles.
- To develop an understanding of Computer-Aided Manufacturing (CAM), Computer Integrated Manufacturing (CIM), manufacturing planning and control, automation, lean production, and Just-in-Time (JIT) manufacturing concepts.

UNIT I FUNDAMENTALS OF COMPUTER GRAPHICS

9

Product cycle - Design process - sequential and concurrent engineering - Computer-aided design - CAD system architecture - Computer graphics - coordinate systems - 2D and 3D transformations homogeneous coordinates - Line drawing - Clipping - viewing transformation.

UNIT II GEOMETRIC MODELING

9

Geometric Modeling - types - Wireframe, surface and solid modeling - Boundary Representation, constructive solid geometry - Graphics standards - assembly modeling - use of software packages - Data exchange standards - IGES, STEP, CALS, etc. - communication standards.

UNIT III CNC MACHINES

9

NC, CNC & DNC - types of CNC - constructional features - drives and control systems - feedback devices - Interchangeable tooling system - preset & qualified tools - ISO specification - Machining center - Turning center - CNC EDM - CNC wire cut EDM.

UNIT IV CNC PROGRAMMING

9

Manual part programming - steps involved - sample program in lathe & milling. - Computer-aided part programming - APT - CAM package - canned cycles - Programming.

UNIT V FUNDAMENTALS OF CAM

9

Brief introduction to CAM - Manufacturing Planning, Manufacturing control - Concurrent Engineering - CIM concepts - Computerized elements of CIM system - Types of production Basic Elements of an Automated system - Levels of Automation - Lean Production and Just-In-Time Production.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the principles of computer graphics, CAD system architecture, coordinate systems, geometric transformations, and viewing techniques used in computer-aided design.
- Examine geometric modeling techniques, assembly modeling approaches, graphics standards, and data exchange standards for engineering design applications.
- Compare the constructional features, control systems, tooling arrangements, and operational characteristics of CNC machines and advanced machining centres.
- Classify CNC programming techniques, including manual part programming, computer-aided part programming, APT, CAM packages, and canned cycles for manufacturing applications.
- Differentiate the concepts of CAM, CIM, manufacturing planning and control, automation, lean production, and Just-in-Time (JIT) production in modern manufacturing systems.

TEXTBOOKS

- Mikell P. Groover, "Automation, Production Systems, and Computer-Integrated Manufacturing, Pearson Education", Fifth Edition, 2023.
- Ibrahim Zeid, "Mastering CAD/CAM", McGraw-Hill Education, Third Edition, 2021.
- P. N. Rao, "CAD/CAM: Principles and Applications", McGraw-Hill Education (India), Fourth Edition, 2022.

REFERENCES

- M. P. Groover and Emory W. Zimmers Jr., "CAD/CAM: Computer-Aided Design and Manufacturing", Pearson Education, Second Edition (Reprint), 2020
- M. P. Groover, "Fundamentals of Modern Manufacturing: Materials, Processes, and Systems", John Wiley & Sons, Eighth Edition, 2025
- Ibrahim Zeid and R. Sivasubramanian, "CAD/CAM: Theory and Practice", McGraw Hill Education, Second Edition, 2020.

E-RESOURCES

- <https://nptel.ac.in/courses/112102103> (Overview of CNC machines)
- <http://www.digimat.in/nptel/courses/video/112104289/L20.html> - (CNC Part Programming)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	2	3	-	-	-	-	-	1	-	-
2	3	3	2	2	3	-	-	-	-	-	1	-	-
3	3	3	2	2	3	-	-	-	-	-	1	-	-
4	3	3	2	2	3	-	-	-	-	-	1	-	-
5	3	3	2	2	3	-	-	-	-	-	1	-	-
AVG.	3	3	2	2	3	-	-	-	-	-	1	-	-

1-Low 2-Medium 3-High '-' – No Correlation

 Chairman - BOS





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23MDO611

HOSPITAL MANAGEMENT

L T P C

3 0 0 3

OBJECTIVES

- To familiarize students with the fundamentals of hospital administration and management.
- To impart knowledge on human resource management practices in healthcare organizations.
- To explore marketing research processes and consumer behavior in healthcare services.
- To introduce hospital information systems and supportive healthcare services.
- To inculcate awareness of quality assurance, accreditation standards, and patient safety practices.

UNIT I OVERVIEW OF HOSPITAL ADMINISTRATION

9

Distinction between Hospital and Industry, Challenges in Hospital Administration – Hospital Planning- Equipment Planning – Functional Planning – Current Issues in Hospital Management – Telemedicine - Bio-Medical Waste Management.

UNIT II HUMAN RESOURCE MANAGEMENT IN HOSPITAL

9

Principles of HRM – Functions of HRM – Profile of HRD Manager – Tools of HRD –Human Resource Inventory – Manpower Planning. Different Departments of Hospital, Recruitment, Selection, Training Guidelines –Methods of Training – Evaluation of Training – Leadership grooming and Training, Promotion – Transfer, Communication – nature, scope, barriers, styles and modes of communication.

UNIT III MARKETING RESEARCH PROCESS

9

Marketing information systems - assessing information needs, developing & disseminating information - Market Research process - Other market research considerations – Consumer Markets & Consumer Buyer Behaviour - Model of consumer behaviour - The buyer decision process - Model of business buyer behavior – Major types of buying situations - WTO and its implications.

UNIT IV HOSPITAL INFORMATION SYSTEMS & SUPPORTIVE SERVICES

9

Management Decisions and Related Information Requirement - Clinical Information Systems - Administrative Information Systems - Support Service Technical Information Systems – Medical Transcription, Medical Records Department – Central Sterilization and Supply Department– Pharmacy– Food Services - Laundry Services.

UNIT V QUALITY AND SAFETY ASPECTS IN HOSPITAL

9

Quality system – Elements, implementation of quality system, Documentation, Quality auditing, International Standards ISO 9000 – 9004 – Features of ISO 9001 – ISO 14000 – Environment Management Systems. NABA, JCI, NABL. Security – Loss Prevention – Fire Safety – Alarm System – Safety Rules. Health Insurance & Managing Health Care – Medical Audit – Hazard and Safety in a hospital Setup.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Examine the principles and functions of hospital administration in healthcare organizations.
- Analyze human resource management practices and their role in hospital operations.
- Apply marketing research techniques for healthcare service management.
- Utilize hospital information systems and supportive services for decision-making.
- Develop quality assurance and patient safety strategies in healthcare settings.

TEXT BOOKS

1. Gupta Joydeep Das, "Hospital Administration and Management: A Comprehensive Guide", Third Edition, 2023.
2. G.D.Kunders, "Hospitals – Facilities Planning and Management", TMH, New Delhi, Fifth Edition, Reprint 2018.

REFERENCES

1. Bruce J. Fried and Myron D. Fottler, "Human Resources in Healthcare Managing for Success", Fourth Edition, 2020.
2. James R. Langabeer, "Handbook on Health Care Operations Management", Jones & Bartlett Publishers, 2020.

E-RESOURCES

1. <https://www.youtube.com/watch?v=2J-F4Fi2VRQ> – (Introduction to Human Resource Management in Healthcare Settings)
2. <https://www.youtube.com/watch?v=dXHJemWm1xl&pp=ygUVI2hvc3BpdGFsX2luZm9ybWF0aW9u> – (Hospital Information Management Software (HIMS))

Mapping of COs, POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	1	3	1	-	-	2	1	-	-	1	1	-	-
2	1	2	2	1	-	1	2	1	1	2	1	-	-
3	1	2	3	1	1	1	1	-	1	2	1	-	-
4	1	2	2	2	3	1	1	-	1	1	2	-	-
5	1	3	2	2	2	3	2	1	1	2	2	-	-
AVG.	1	2.4	2	1.5	2	1.6	1.4	1.0	1.0	1.6	1.4	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Chairman - BoS





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23RA0609

TIRUCHENGODE- 637 205 FUNDAMENTALS OF ROBOTICS

L T P C
3 0 0 3

OBJECTIVES

- To introduce the basics of robots, including anatomy, types, specifications, and applications.
- To impart knowledge on robot kinematics, including forward/inverse kinematics and transformation matrices for manipulators.
- To familiarize with robot drive systems and end effectors, including types, features, applications, and design considerations.
- To discuss sensors in robotics, including force, tactile, proximity, and their applications and safety aspects.
- To enhance understanding of robot programming and its applications in industrial and specialized fields.

UNIT I BASICS OF ROBOT

9

Robot – Definition – Robot Anatomy – Co-ordinate systems, Work Envelope, types and classification – specifications – Pitch, yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and their functions – Need for Robots – Different Applications.

UNIT II ROBOT KINEMATICS

9

Forward kinematics, inverse kinematics and the difference: forward kinematics and inverse Kinematics of Manipulators with two, three degrees of freedom (in 2 dimensional), four degrees of freedom (in 3 dimensional) – derivations and problems. Homogeneous transformation matrices, translation and rotation matrices.

UNIT III ROBOT DRIVE SYSTEMS AND END EFFECTORS

9

Pneumatic Drives – Hydraulic Drives – Mechanical Drives – Electrical Drives – D.C. Servo Motors, Stepper Motor, A.C. Servo Motors – Salient Features, Applications and Comparison of All These Drives. End Effectors – Grippers – Mechanical Grippers, Pneumatic and Hydraulic Grippers, Magnetic grippers, vacuum grippers, internal grippers and external grippers, selection and design considerations of a gripper

UNIT IV SENSORS IN ROBOTICS

9

Force sensors, touch and tactile sensors, proximity sensors, non-contact sensors, safety considerations in robotic cell, proximity sensors, fail safe hazard sensor systems, and compliance mechanism

UNIT V PROGRAMMING AND APPLICATIONS OF ROBOT

9

Teach pendant programming, lead through programming, robot programming languages – VAL programming – Motion Commands, Sensors commands, End-Effectors Commands, and simple programs - Role of robots in inspection, assembly, material handling, underwater, space and medical fields.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to,

- Identify robot types, anatomy, specifications, and applications.
- Illustrate forward and inverse kinematics of manipulators using transformation matrices.
- Analyze and select appropriate drive systems and end effectors for robotic applications.
- Apply sensor technologies and safety systems to robotic cells for reliable detection, hazard prevention, and compliant operation.
- Apply robot programming techniques and analyze their applications in industrial and specialized fields.

TEXTBOOKS

1. Ganesh.S.Hedge, "A textbook of Industrial Robotics", Lakshmi Publications, Second Edition, 2015.
2. Mikell.P.Groover, "Industrial Robotics–Technology, Programming and applications", McGraw Hill, Second Edition, 2017.

REFERENCES

1. Fu K.S. Gonalz R.C. and ice C.S.G., "Robotics Control, Sensing, Vision and Intelligence", McGraw Hill book co., Second Edition, 2007.
2. John. J.Craig, "Introduction to Robotics: Mechanics and Control", Fourth Edition, 2022.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_me37/preview- (Fundamentals of Robotics)
2. <https://archive.nptel.ac.in/courses/112/108/112108298> (Basics of Robotics)

Mapping of COs-POs& PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	-	3	3	-	1	-	2	-	1	-	-
2	3	2	-	3	3	-	-	-	2	-	2	-	-
3	3	2	-	3	3	-	-	2	2	2	2	-	-
4	3	2	-	3	3	2	-	2	2	2	2	-	-
5	3	2	-	2	3	2	-	2	2	3	3	-	-
AVG.	3.0	2	-	2.8	3.0	2.0	1.0	2.0	2.0	2.3	2.0	-	-

1.Low 2-Medium 3-High '-' – No Correlation


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TIRUCHENGODE- 637 205



23CS0612

CYBER FORENSICS AND ETHICAL HACKING

L T P C
3 0 0 3

OBJECTIVES

- To impart knowledge about the cyber crime and forensics.
- To acquire knowledge about forensic tools used for evidence acquisition and analysis.
- To familiarize with skills to collect, analyse, and present digital evidence following accepted forensic procedures and legal requirements.
- To impart the fundamental concepts, principles, and scope of ethical hacking in cyber security.
- To acquire the ethical hacking principles and security best practices to identify, analyze, and mitigate vulnerabilities in web applications.

UNIT I INTRODUCTION TO CYBER CRIME AND FORENSICS

9

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Role of ECD and ICT in Cybercrime - Classification of Cyber Crime. The Present and future of Cybercrime - Cyber Forensics -Steps in Forensic Investigation - Forensic Examination Process - Types of CF techniques - Forensic duplication and investigation - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT II FORENSICS TOOLS

9

Processing Crime and Incident Scenes – Digital Evidence - Sources of Evidence -Working with File Systems. - Registry - Artifacts - Current Computer Forensics Tools: Software/ Hardware Tools - Forensic Suite - Acquisition and Seizure of Evidence from Computers and Mobile Devices - Chain of Custody- Forensic Tools.

UNIT III VALIDATING FORENSICS DATA

9

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics - Analysis of Digital Evidence - Admissibility of Evidence - Cyber Laws in India.

UNIT IV ETHICAL HACKING

9

Introduction to Ethical Hacking – Foot printing and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats – Sniffing – Email Tracking .

UNIT V ETHICAL HACKING IN WEB

9

Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.

TOTAL: 45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Understand the basics of cyber crime and computer forensics
- Apply the forensic tools for acquiring, preserving, and analyzing digital evidence
- Analyze and validate digital evidence by applying standard forensic procedure
- Apply ethical hacking methodologies to perform reconnaissance, scanning, enumeration, and vulnerability
- Analyze the security vulnerabilities in web applications, wireless networks, and mobile platform.

TEXT BOOKS

1. Bill Nelson, Amelia Phillips, Christopher Steuart, — Guide to Computer Forensics and Investigations II, Cengage Learning, India Sixth Edition, 2019.
2. CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, Version 11, 2021.
3. Deje, S. Murugan - Cyber Forensics, Oxford University Press, India, 2018

REFERENCES

1. John R.Vacca, "Computer Forensics ", Cengage Learning, 2005
2. Marjie T.Britz, "Computer Forensics and Cyber Crime: An Introduction 3rd Edition, Prentice Hall, 2013.
3. AnkitFadia " Ethical Hacking, Second Edition", Macmillan India Ltd, 2006
4. Kenneth C.Brancik "Insider Computer Fraud", Auerbach Publications, Taylor &Francis Group– 2008.

E-RESOURCES

- 1.https://onlinecourses.swayam2.ac.in/e-learning/preview/cec21_ge10
- 2.<https://nptel.ac.in/courses/106105217>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	-	-	1	1	1	-	-	-	1	-	-
2	3	2	1	2	3	1	2	1	1	-	2	-	-
3	3	3	1	3	3	2	3	1	2	-	2	-	-
4	3	3	2	2	3	2	2	1	1	-	2	-	-
5	3	3	3	2	3	2	3	1	2	1	3	-	-
AVG.	3	2.6	1.75	2.25	2.6	1.6	2.2	1	1.5	1	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation

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TIRUCHENGODE- 637 205



23PMO608

PHARMACEUTICAL NANOTECHNOLOGY

L T P C
3 0 0 3

OBJECTIVES

- To introduce the evolution, principles, and applications of nanotechnology in drug delivery.
- To familiarize students with the principles of biopharmaceutics and pharmacokinetics.
- To provide knowledge of the principles, preparation, characterization, evaluation, and pharmaceutical applications of closed bilayered drug delivery systems.
- To develop a comprehensive understanding of programmed drug delivery systems, drug targeting strategies.
- To enhance understanding of the interactions of nanomaterials with biological systems, nanotoxicity.

UNIT I FUNDAMENTALS OF NANOTECHNOLOGY IN DRUG DELIVERY

9

Nanotechnology in Drug Delivery- Past, Present and Future- Conventional delivery of pharmaceuticals and its limitations, Significance of nano-size in Pharmacy, biotechnology and medicine, Physicochemical Principles of nano-sized Drug Delivery Systems, Biopharmaceutical, Physiological, and Clinical Considerations for Nanotechnology in Drug Delivery.

UNIT II PHARMACOKINETICS AND BIO DISTRIBUTION

9

Introduction- Definitions, concepts of Absorption, Distribution, Metabolism and excretion, concentration time profile, Bioavailability, bio pharmaceuticals and pharmacokinetics in drug research. Biotransformation of drugs- Drug metabolizing enzymes, chemical pathways of Drug transformation, Phase-I and Phase-II reactions, Factors affecting drug transformation Prodrugs- Application of produg design.

UNIT III NANO CARRIERS FOR DRUG DELIVERY

9

Closed bilayered system- Introduction, structural aspects, preparation, characterization, evaluation and applications of liposomes, niosomes, erythrosomes. Polymeric Nanoparticles- Introduction, preparation, characterization, evaluation and pharmaceutical applications.

UNIT IV CONTROLLED AND TARGETED DRUG DELIVERY

9

Programmed Drug Delivery Systems- principles of sustained, controlled, pulsatile and triggered release of drug from nanoparticles. Concept of targeting- Targeting Approaches, Transport Across Biological Barriers, mechanisms of drug targeting, Ideal carrier system and approach Disease-Related Approaches by Nanotherapeutics- nanoparticles for Cancer, Skin Diseases, Bacterial, Diseases, Parasites Diseases and Inflammatory Disease.

UNIT V NANO TOXICOLOGY AND REGULATORY ISSUES

9

Human health and safety- Interaction of nanomaterials with biological systems, Toxicology of





nanoparticles- in-vitro and in-vivo, Complications with Nanotoxicity studies, environmental impact of nano-materials, Regulatory Toxicology.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Apply the physicochemical principles governing nano-sized drug delivery systems.
- Explain the role of biopharmaceutics and pharmacokinetics in drug discovery, development, and therapeutic optimization.
- Analyze the physicochemical properties and performance of liposomes, niosomes, erythrosomes, and polymeric nanoparticles for pharmaceutical applications.
- Explain the principles of programmed drug delivery systems, including sustained, controlled, pulsatile, and triggered drug release from nanoparticles.
- Apply appropriate approaches to assess the toxicological effects and safety of nanomaterials using in-vitro and in-vivo studies.

TEXT BOOKS

1. Padma Devarajan, Sanyog Jain, "Targeted Drug Delivery: Concepts and Design", Springer publisher, First Edition, 2015.
2. M. A. Mateescu P. Ispas-Szabo E. Assaad, "Controlled Drug Delivery", Woodhead Publishing, Second Edition, 2014.

REFERENCES

1. Michael E. Aulton, "Pharmaceutics", Churchill Livingstone Publisher, Second Edition, 2013.
2. Philippe Houdy, Marcel Lahmani, "Nanoethics and Nanotoxicology", Springer-Verlag Publisher, Second edition, 2011.

E-RESOURCES

1. <https://onlinelibrary.wiley.com/doi/book/10.1002/9783527800681>
2. <https://www.scribd.com/document/742651789/Nano-Technology-1>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	3	2	2	-	-	-	-	2	-	-
2	2	2	2	3	2	1	2	-	-	-	2	-	-
3	2	2	2	2	2	2	3	-	-	-	2	-	-
4	2	3	3	3	3	2	1	-	-	1	2	-	-
5	3	3	3	3	3	2	2	1	-	-	3	-	-
AVG.	2.4	2.6	2.4	2.8	2.4	1.8	2	1	-	1	2.2	-	-

1-Low 2-Medium 3-High '-' – No Correlation

[Signature]
Chairman - BoS





23MAO606

GRAPH THEORY

L	T	P	C
3	0	0	3

OBJECTIVES

- To introduce the fundamental concepts of graph theory.
- To explain the properties of trees, spanning trees, and fundamental circuits.
- To explain the concepts of connectivity and planarity.
- To provide knowledge of graph coloring, covering and partitioning.
- To introduce the concepts of directed graphs and Euler digraphs.

UNIT I INTRODUCTION, PATHS AND CIRCUITS

9

Graphs introduction – Finite and Infinite graphs – Incidence and degree – Isolated vertex, Pendant vertex and Null graph – Isomorphism – Sub graphs – Walks, Paths and Circuits – Connected graphs, disconnected graphs and components – Euler graphs – Hamiltonian paths and circuits.

UNIT II TREES AND FUNDAMENTAL CIRCUITS

9

Trees – Properties of trees – Pendant vertices in a tree – Distance and centers in tree – Rooted and binary trees – Spanning trees – Fundamental circuits – Spanning trees in a weighted graph.

UNIT III CONNECTIVITY AND PLANARITY

9

Connectivity and separability – Network flows – 1-isomorphism – 2-isomorphism – Combinational and geometric graphs – Planer graphs – Kuratowski's two graphs – Different representation of a planer graph.

UNIT IV COLORING, COVERING AND PARTITIONING

9

Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four color problem.

UNIT V DIRECTED GRAPH

9

Directed graphs – Types of directed graphs – Digraphs and binary relations – Directed paths and connectedness – Euler digraphs.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Understand the fundamental concepts of graphs, paths, circuits, Euler and Hamiltonian graphs.
- Apply tree properties and fundamental circuits to solve engineering problems.
- Analyze graph connectivity, network flows and planar graphs for modeling real-world systems.
- Apply graph coloring, matching, covering, and partitioning techniques to optimization and scheduling problems.
- Analyze directed graph and Euler digraphs in engineering applications.





TEXT BOOKS

1. Narsingh Deo., "Graph theory with applications to engineering and computer Science ",
Prentice-Hall of India Pvt.Ltd, Fifth Edition, 2016.
2. L.R.Foulds , "Graph Theory Applications", Springer LTD, Seventh Edition, 2016

REFERENCES

1. Kenneth H Rosen, "Discrete Mathematics and its Applications", McGraw Hill Education
(India) Private Ltd., Seventh Edition,, 2011.
2. Ralph P Grimaldi and B.V Ramana., "Discrete and Combinatorial Mathematics",
Pearson Education limited, Fifth Edition, 2014.

E-RESOURCES

1. <https://nptel.ac.in/courses/111106102> (Graph theory)
2. <https://nptel.ac.in/courses/128106001> (Graph theory)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	-	-	-	-	-	-	-	-	1	-	-
2	3	3	2	-	-	-	-	-	-	-	1	-	-
3	3	3	2	1	-	-	-	-	-	-	1	-	-
4	3	3	3	1	-	-	-	-	-	-	2	-	-
5	3	3	2	1	-	-	-	-	-	-	2	-	-
AVG.	3	2.8	2.3	1	-	-	-	-	-	-	1.4	-	-

1-Low 2-Medium 3-High '-' – No Correlation

S. S. S.
Chairman - BoS





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OPEN ELECTIVE II

23CE0704

REMOTE SENSING CONCEPTS

L T P C
3 0 0 3

OBJECTIVES

- To inculcate the concepts of remote sensing processes.
- To impart knowledge on applications of standard atmospheric profile and earth material.
- To familiarize with the orbits and platforms.
- To Instruct the various remote sensing techniques
- To enhance the elements of data interpretation.

UNIT I REMOTE SENSING AND ELECTROMAGNETIC RADIATION

9

Definition – components of RS – History of Remote Sensing – Merits and demerits of data collation between conventional and remote sensing methods - Electromagnetic Spectrum – Radiation principles - Wave theory, Planck's law, Wien's Displacement Law, Stefan's Boltzmann law, Kirchoff's law – Radiation sources: active & passive - Radiation Quantities.

UNIT II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIAL

9

Standard atmospheric profile – main atmospheric regions and its characteristics – interaction of radiation with atmosphere – Scattering, absorption and refraction – Atmospheric windows - Energy balance equation – Specular and diffuse reflectors – Spectral reflectance & emittance – Spectroradiometer – Spectral Signature concepts – Typical spectral reflectance curves for vegetation, soil and water – solid surface scattering in microwave region.

UNIT III ORBITS AND PLATFORMS

9

Motions of planets and satellites – Newton's law of gravitation - Gravitational field and potential - Escape velocity - Kepler's law of planetary motion - Orbit elements and types – Orbital perturbations and maneuvers – Types of remote sensing platforms - Ground based, Airborne platforms and Space borne platforms – Classification of satellites – Sun synchronous and Geosynchronous satellites – Lorange Orbit.

UNIT IV SENSING TECHNIQUES

9

Classification of remote sensors – Resolution concept: spatial, spectral, radiometric and temporal resolutions - Scanners - Along and across track scanners – Optical-infrared sensors – Thermal sensors –microwave sensors – Calibration of sensors - High Resolution Sensors - LIDAR , UAV – Orbital and sensor characteristics of live Indian earth observation satellites.

UNIT V DATA PRODUCTS AND INTERPRETATION

9

Photographic and digital products – Types, levels and open-source satellite data products – selection and procurement of data– Visual interpretation: basic elements and interpretation keys -Digital interpretation – Concepts of Image rectification, Image enhancement and Image classification.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Examine the concepts and laws related to remote sensing.
- Analyze the interaction of electromagnetic radiation with atmosphere and earth material.
- Develop the satellite orbits and different types of satellites.
- Classify the different types of remote sensors.
- Construct the concepts of interpretation of satellite imagery.

TEXT BOOKS

1. Thomas M. Lillesand, Ralph W. Kiefer and Jonathan W. Chipman, "Remote Sensing and Image interpretation", John Wiley and Sons, Ninth Edition, 2019.
2. George Joseph and C Jeganathan, "Fundamentals of Remote Sensing", Universities Press (India) Private limited, Third Edition, 2020.
3. Janza, F.Z., Blue H.M. and Johnson, J.E. "Manual of Remote Sensing. Vol. I", American Society of Photogrammetry, Virginia, Fifth Edition, 2021.

REFERENCES

1. Verbyla, David, "Satellite Remote Sensing of Natural Resources", CRC Press, Third Edition, 2019
2. Paul Curran P.J. "Principles of Remote Sensing. Longman", RLBS, Eighth Edition, 2022.
3. Charles Elachi and Jacob Van Zyl, "Introduction to Physics and Techniques of Remote Sensing", Wiley Publication, Second Edition, 2020.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc22_ce84/preview (Remote Sensing and GIS)
2. https://onlinecourses.nptel.ac.in/noc20_ce29/preview (Remote Sensing Essentials)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	-	1	1	2	-	-	-	2	1	1	-	-
2	3	-	1	1	2	-	-	-	2	1	1	-	-
3	3	-	1	1	2	-	-	-	2	1	1	-	-
4	3	-	1	1	2	-	-	-	2	1	1	-	-
5	3	-	1	1	2	-	-	-	2	1	1	-	-
AVG.	3	-	1	1	2	-	-	-	2	1	1	-	-

1-Low 2-Medium 3-High '-' – No Correlation


Chairman - BoS





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23ECO708

ENERGY TECHNOLOGY

L T P C

3 0 0 3

OBJECTIVES

- To acquire knowledge of the basic concepts of energy, energy resources, and energy consumption.
- To familiarize the working principles of conventional power plants such as thermal, hydel, and nuclear power plants.
- To impart knowledge on the principles and applications of renewable energy sources like solar, wind, tidal, ocean, and geothermal energy.
- To enhance understanding of biomass energy conversion methods, fuel cells, and energy storage systems.
- To foster awareness of energy conservation techniques and energy auditing for improving industrial energy efficiency.

UNIT I INTRODUCTION

9

Units of energy, conversion factors, general classification of energy, world energy resources and energy consumption, Indian energy resources and energy consumption, energy crisis, energy alternatives, Renewable and non-renewable energy sources and their availability. Prospects of Renewable energy sources

UNIT II CONVENTIONAL ENERGY

9

Conventional energy resources, Thermal, hydel and nuclear reactors, thermal, hydel and nuclear power plants, efficiency, merits and demerits of the above power plants, combustion processes, fluidized bed combustion.

UNIT III NON-CONVENTIONAL ENERGY

9

Solar energy, solar thermal systems, flat plate collectors, focusing collectors, solar water heating, solar cooling, solar distillation, solar refrigeration, solar dryers, solar pond, solar thermal power generation, solar energy application in India, energy plantations. Wind energy, types of windmills, types of wind rotors, ocean thermal energy conversion, tidal energy conversion, geothermal energy.

UNIT IV BIOMASS ENERGY

9

Biomass energy resources, thermo-chemical and biochemical methods of biomass conversion, combustion, gasification, pyrolysis, biogas production, ethanol, fuel cell and its types, energy storage routes like thermal energy storage, chemical, mechanical storage and electrical storage.

UNIT V ENERGY CONSERVATION

9

Energy conservation in chemical process plants, energy audit, energy saving in heat exchangers, distillation columns, dryers, ovens and furnaces and boilers, steam economy in chemical plants, energy conservation.

TOTAL : 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Apply conversion factors in solving energy-related numerical problems.
- Analyze merits, demerits and combustion processes of conventional plants.
- Examine about solar, wind, tidal, wave and geothermal energy sources.
- Identify the technological basis for harnessing renewable energy sources.
- Analyze energy losses in heat exchangers, boilers and furnaces.

TEXT BOOKS

1. Rao, S. and Parulekar, B.B., Energy Technology, Khanna Publishers, 2005.
2. Nagpal, G.R., Power Plant Engineering, Khanna Publishers, 2008.

REFERENCES

1. El. Wakil, Power Plant Technology, Tata McGraw Hill, New York, 2002.
2. Sukhatme. S.P., Solar Energy - Thermal Collection and Storage, Tata McGraw hill, New Delhi, 1981.

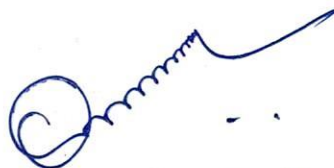
E-Sources

1. [https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_ch27-\(Renewable Energy Engineering: Solar, Wind and Biomass Energy Systems\)](https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_ch27-(Renewable%20Energy%20Engineering%3A%20Solar,%20Wind%20and%20Biomass%20Energy%20Systems))
2. [https://nptel.ac.in/courses/121106014?utm_source=chatgpt.com-\(NOC-Conventional Sources\)](https://nptel.ac.in/courses/121106014?utm_source=chatgpt.com-(NOC-Conventional%20Sources))

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	2	3	2	3	3	-	-	1	1	-	3	-	-
2	3	1	3	3	-	-	1	1	-	3	3	-	-
3	2	2	2	3	3	1	-	1	1	-	3	-	-
4	2	2	1	3	3	1	1	1	-	1	3	-	-
5	2	2	1	3	3	1	1	1	-	1	3	-	-
AVG.	2.2	2	1.8	3	3	1	1	1	1	1.6	3	-	-

1-Low 2-Medium 3-High '-' - No Correlation


Chairman - BoS





23EE0709

SENSORS, ACTUATORS AND ITS APPLICATION

L T P C

3 0 0 3

OBJECTIVES

- To familiarize common types of sensor and actuators used in automotive vehicles.
- To enhance measuring equipment's for the measurement of pressure force, temperature and flow.
- To acquire new ideas in designing the sensors and actuators for automotive application
- To inculcate the operation of the sensors, actuators and electronic control.
- To develop temperature control actuators for vehicles.

UNIT I INTRODUCTION TO MEASUREMENTS AND SENSORS

9

Sensors: Functions- Classifications- Main technical requirement and trends Units and standards- Calibration methods- Classification of errors- Error analysis- Limiting error- Probable error- Propagation of error- Odds and uncertainty- principle of transduction-Classification. Static characteristics- mathematical model of transducers- Zero, First and Second order transducers- Dynamic characteristics of first and second order transducers for standard test inputs .

UNIT II VARIABLE RESISTANCE AND INDUTANCE SENSORS

9

Principle of operation – construction details – Characteristics and applications of resistive potentiometer- Strain gauges- Resistive thermometers- Thermistors- Piezoresistive sensors Inductive potentiometer- Variable reluctance transducers:- EI pick up and LVDT.

UNIT III VARIABLE AND OTHER SPECIAL SENSORS

9

Variable air gap type, variable area type and variable permittivity type- capacitor microphone Piezoelectric, Magnetostrictive, Hall Effect, semiconductor sensor- digital transducers-Humidity Sensor. Rain sensor, climatic condition sensor, solar, light sensor, antiglare sensor.

UNIT IV AUTOMOTIVE ACTUATORS

9

Electromechanical actuators - Fluid-mechanical actuators - Electrical machines- Direct-current machines - Three-phase machines - Single-phase alternating-current Machines - Duty-type ratings for electrical machines. Working principles, construction and location of actuators viz. Solenoid, relay, stepper motor etc.

UNIT V AUTOMATIC TEMPERATURE CONTROL ACTUATORS

9

Different types of actuators used in automatic temperature control- Fixed and variable displacement temperature control- Semi Automatic- Controller design for Fixed and variable displacement type air conditioning system.

TOTAL : 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Apply common types of sensor and actuators used in vehicles.
- Examine measuring equipment's for the measurement of pressure force, temperature and flow.
- Analyze the sensors and actuators for automotive application.
- Analyze the operation of the sensors, actuators and electronic control.
- Apply temperature control actuators for vehicles.

TEXT BOOKS

1. Ernest O. Doebelin Dhanesh N.Manik, "Doebelin's Measurement Systems", McGraw Hill Publishers, Seventh Edition, 2019.
2. Bosch, "Automotive Electrics and Automotive Electronics Systems and Components, Networking and Hybrid Drive", Fifth Edition, 2007.

REFERENCES

1. William Ribbens, "Understanding Automotive Electronics -An Engineering Perspective," Elsevier Butterworth-Heinemann Publishers, Seventh Edition, 2012.
2. James D Halderman, "Automotive Electrical and Electronics", Prentice Hall, USA, 2013.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_ee32/preview - (Sensors and Actuators)
2. <https://archive.nptel.ac.in/noc/courses/noc19/SEM2/noc19-ee41/> - (Sensors and Actuators)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	3	3	-	-	-	-	-	2	-	-
2	3	3	3	3	3	-	-	-	-	-	2	-	-
3	3	3	3	3	3	-	-	-	-	-	2	-	-
4	3	3	3	3	3	-	-	-	-	-	2	-	-
5	3	3	3	3	3	-	-	-	-	-	2	-	-
AVG.	3	3	3	3	3	-	-	-	-	-	2	-	-

1-Low 2-Medium 3-High '-' - No Correlation.

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23MEO703

FUNDAMENTALS OF MECHATRONICS

L T P C

3 0 0 3

OBJECTIVES

- To train students in the basic concepts of mechatronics and explain the working principles of commonly used sensors and transducers.
- To teach the architecture, instruction set, and operation of the 8085 microprocessor for control applications.
- To explain and train students in interfacing techniques using 8255 PPI for applications such as ADC/DAC, temperature control, motor control, and traffic control.
- To familiarize students with the fundamentals of Programmable Logic Controllers (PLC), including I/O processing, timers, and counters used in industrial automation.
- To train students on actuators and mechatronics system design, supported by real-time case studies.

UNIT I INTRODUCTION AND SENSORS

9

Introduction to Mechatronics – Systems – Need for Mechatronics – Emerging areas of Mechatronics – Classification of Mechatronics. Sensors and Transducers: Static and Dynamic Characteristics of Sensor, Potentiometers – LVDT – Capacitance Sensors – Strain Gauges – Eddy Current Sensor – Hall Effect Sensor – Temperature Sensors – Light Sensors.

UNIT II 8085 MICROPROCESSOR

9

Introduction – Pin Configuration - Architecture of 8085 – Addressing Modes – Instruction set, Timing diagram of 8085.

UNIT III PROGRAMMABLE PERIPHERAL INTERFACE

9

Introduction – Architecture of 8255, Keyboard Interfacing, LED display – Interfacing, ADC and DAC Interface, Temperature Control – Stepper Motor Control – Traffic Control Interface.

UNIT IV PROGRAMMABLE LOGIC CONTROLLER

9

Introduction – Architecture – Input / Output Processing – Programming with Timers, Counters and Internal relays – Data Handling – Selection of PLC.

UNIT V ACTUATORS AND MECHATRONICS SYSTEM DESIGN

9

Types of Stepper and Servo motors – Construction – Working Principle – Characteristics, Stages of Mechatronics Design Process – Comparison of Traditional and Mechatronics Design Concepts with Examples – Case studies of Mechatronics Systems – Pick and Place Robot – Engine Management system – Automatic Car Park Barrier.

TOTAL: 45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Apply basic mechatronics concepts and select suitable sensors and transducers for simple engineering applications.
- Develop basic control and interfacing programs using the 8085 microprocessor instruction set and addressing modes.
- Design real-time interfacing applications using 8255 PPI, ADC/DAC, and display devices.
- Apply PLC programming concepts with timers, counters, and I/O modules for industrial automation tasks.
- Analyze actuator performance and integrate mechatronics system designs through practical case studies such as pick-and-place robots and engine management systems.

TEXTBOOKS

1. Bolton W., "Mechatronics", Pearson Education, Seventh Edition, 2019.
2. Ramesh S Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", Penram International Publishing Private Limited, Sixth Edition, 2013.
3. Dr. JayashreeDeka, Mayuri Sanjay Mhaske, Ajeet Bhagwat Bhane, Kiran C, "Mechatronics", Quill Tech Publications, First Edition, 2025.

REFERENCES

1. Devadas Shetty and Richard A. Kolk, "Mechatronics Systems Design", Cengage Learning, 2019.
2. NitaigourPremchandMahalik, "Mechatronics Principles, Concepts and Applications", McGraw Hill Education, 2020.
3. Smaili.A and Mrad. F, "Mechatronics Integrated Technologies for Intelligent Machines", Oxford University Press, 2018.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_me27/preview - (Mechatronics)
2. https://onlinecourses.nptel.ac.in/noc25_me179/preview- (Design of Mechatronics Systems)


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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	-	-	-	-	-	-	-	1	-	-
2	3	2	2	-	-	-	-	-	-	-	1	-	-
3	3	2	2	-	-	-	-	-	-	-	1	-	-
4	3	2	2	-	-	-	-	-	-	-	1	-	-
5	3	2	2	-	-	-	-	-	-	-	1	-	-
AVG.	3	2	2	-	-	-	-	-	-	-	1	-	-

1-Low 2-Medium 3-High '-' –No Correlation


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23ME0704

TIRUCHENGODE- 637 205

NANOTECHNOLOGY

L T P C

3 0 0 3

OBJECTIVES:

- To provide an understanding of the types of nanostructures and their electronic properties
- To introduce the principles and operational aspects of high-energy ball milling and post-oxidation processes.
- To describe the role of surfactants in controlling the formation and stability of nanoparticles.
- To provide an understanding of thermal analysis methods for assessing the properties of nanomaterials.
- To focus on the emerging applications of nanomaterials in science and engineering.

UNIT I TYPES OF NANOMATERIALS

9

Zero dimensional, one-dimensional and two dimensional nanostructures, Graphene, Fullerene, Carbon nano tubes and, Quantum Dots, Nanoclusture, Zeolites minerals, Nanowires, Block Copolymers, Properties of nanomaterials - Surface properties, Electrical properties, Magnetic properties.

UNIT II PHYSICAL ROUTES

9

High energy ball mill - Chemical Vapour Deposition – Physical Vapour Deposition – Laser ablation - Pulsed laser deposition – Rapid solidification – Arc discharge method- photolysis – radiolysis - Fabrication of nanostructures and microfabrication using wet and dry etching- Lithography.

UNIT III CHEMICAL METHODS

9

Colloidal precipitation – Sol-Gel process– Chemical precipitation: Normal and Reverse reactions-Hydrothermal – Solvothermal – Sonochemical – DC and Pulsed electrodeposition and Electroless deposition – Combustion route.

UNIT IV NANOMATERIAL ANALYSIS

9

Photoluminescence Spectroscopy, Raman Spectroscopy, X-Ray Photoelectron Spectroscopy (XPS), Thermal analysis – Differential Scanning Calorimetry (DSC) – Thermogravimetric Analysis (TGA) – Differential Thermal Analysis (DTA) –Mechanical Testing- Nano Indentation - Vibrating Sample Magnetometer, Zeta Potential and Particle size measurement.

UNIT V APPLICATION OF NANOMATERIALS

9

Molecular Electronics and Nanoelectronics – Nanobots- Biological Applications – Quantum Devices – Nanomechanics - Carbon Nanotube – Photonics- Nano structures as single electron transistor –principle and design.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the structure, classification, and size-dependent properties of nanostructures.
- Apply wet and dry etching techniques for the fabrication of nanostructures and microfabricated devices.
- Analyze chemical synthesis techniques to prepare nanomaterials and evaluate the influence of processing parameters on their properties.
- Explain the principles of nanomaterial characterization techniques.
- Apply the principles and applications of nanomaterials.

TEXT BOOKS

1. G. Cao, "Nanostructures & Nanomaterials: Synthesis, Properties & Applications", Imperial College Press, 2015.
2. T. Pradeep, "A Textbook of Nanoscience and Nanotechnology", Tata McGraw Hill Education, 2019.

REFERENCES

1. B.Bhushan, "Springer Handbook of Nanotechnology", Springer-Verlag Berlin Heidelberg, 2020.
2. G.A. Ozin and A.C. Arsenault, "Nanotechnology: A chemical approach to nanomaterials", Royal Society of Chemistry, 2015.

E-RESOURCES

1. <https://libguides.utdallas.edu/nanotechnology-nanoscience-nanomaterials-guide/sources/books>
2. <https://libguides.lib.msu.edu/nanotechnology/online>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	2	1	2	1	1	2	1	-	-	-
2	3	2	3	2	1	2	1	1	2	1	-	-	-
3	3	2	3	3	1	2	3	1	3	2	-	-	-
4	3	2	3	3	1	2	2	1	3	1	-	-	-
5	3	1	2	2	1	2	2	1	2	2	-	-	-
AVG.	3	1.8	2.6	2.4	1	2	1.8	1	2.4	1.4	-	-	-

1-Low 2-Medium 3-High '-' – No Correlation


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23MEO712

SMART MANUFACTURING

L T P C

3 0 0 3

OBJECTIVES

- To familiarize with the concepts, architecture, and components of Smart Manufacturing systems.
- To provide knowledge of sensing, monitoring, and data acquisition technologies used in modern manufacturing environments.
- To enable application of Industrial IoT and Cyber-Physical Systems for smart manufacturing applications.
- To develop the ability to analyze manufacturing data for process monitoring and predictive maintenance.
- To equip with the knowledge of advanced Industry 4.0 technologies and their applications in smart factory implementation.

UNIT I INTRODUCTION TO SMART MANUFACTURING

9

Evolution of Manufacturing Systems, Conventional Manufacturing vs Smart Manufacturing, Industry 4.0 Concepts, Smart Factory Architecture, Digital Transformation in Manufacturing, Components of Smart Manufacturing, Intelligent Production Systems, Applications and Case Studies.

UNIT II SENSORS AND DATA ACQUISITION

9

Sensors in Manufacturing Automation, Electrical, Optical, Acoustic and Vision Sensors, Smart Sensors and Intelligent Sensors, Machine Vision Systems, Condition Monitoring, Data Acquisition Systems, Sensor Networks for Manufacturing, Shop Floor Data Collection.

UNIT III INDUSTRIAL IoT AND CYBER PHYSICAL SYSTEMS

9

Introduction to IoT and IIoT, IoT Architecture, Smart Connected Manufacturing, Cyber Physical Systems (CPS), Cloud Manufacturing, Fog and Edge Computing, Communication Protocols in Manufacturing, Cyber Security in Smart Factories.

UNIT IV DATA ANALYTICS AND DIGITAL MANUFACTURING

9

Manufacturing Data Analytics, Big Data in Manufacturing, Machine Learning Fundamentals, Predictive Maintenance, Quality Monitoring and Process Optimization, Digital Twin Concepts, Real-Time Monitoring Systems, Decision Support Systems.

UNIT V ADVANCED SMART MANUFACTURING TECHNOLOGIES

9

Additive Manufacturing and 3D Printing, Collaborative Robots (Cobots), Automated Guided Vehicles (AGVs), Flexible Manufacturing Systems, Autonomous Manufacturing, Sustainable Smart Manufacturing, Smart Supply Chain and Logistics, Future Trends in Industry 5.0.

TOTAL:45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Apply the concepts, architecture, and components of Smart Manufacturing systems to manufacturing scenarios.
- Analyze the role of smart and intelligent sensors in enhancing manufacturing efficiency, process monitoring, and decision-making.
- Apply the Industrial IoT and Cyber-Physical Systems to smart manufacturing applications.
- Analyze manufacturing data for process monitoring and predictive maintenance.
- Examine advanced smart manufacturing technologies for modern industrial applications.

TEXT BOOKS

1. Gilchrist, A., "Industry 4.0: The Industrial Internet of Things", Apress, First Edition, 2016.
2. Ustundag, A. and Cevikcan, E., "Industry 4.0: Managing the Digital Transformation", Springer, First Edition, 2018.
3. Jeschke, S., Brecher, C., Song, H. and Rawat, D.B., "Industrial Internet of Things: Cyber manufacturing Systems", Springer, First Edition, 2017.

REFERENCES

1. Song, H., Rawat, D.B., Jeschke, S. and Brecher, C., "Cyber-Physical Systems: Foundations, Principles and Applications", Academic Press, First Edition, 2016.
2. Buyya, R. and Dastjerdi, A.V., "Internet of Things: Principles and Paradigms", Morgan Kaufmann, First Edition, 2016.
3. Locher, D.A., "Smart Manufacturing: The Lean Six Sigma and Systems Engineering Approach", CRC Press, First Edition, 2017.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc22_cs95/preview (Industrial Internet of Things, Cyber Physical Systems and Data Analytics)
2. <https://onlinecourses.nptel.ac.in/127101872> (Industry 4.0: Managing the Digital Transformation)

Mapping of COs-POs& PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	-	-	1	-	-	-	-	-	1	-	-
2	2	3	-	1	3	-	-	-	-	-	-	-	-
3	2	3	2	2	3	-	-	-	-	-	1	-	-
4	2	3	-	3	3	-	1	-	-	-	2	-	-
5	1	2	3	2	3	-	2	-	-	-	2	-	-
AVG.	2.0	2.6	2.5	2.0	2.6	-	1.5	-	-	-	1.5	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No correlation

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TIRUCHENGODE- 637 205



23RA0707

MOBILE ROBOTS

L T P C
3 0 0 3

OBJECTIVES

- To introduce locomotion principles and control of mobile robots.
- To focus on kinematic modeling and constraints in mobile systems.
- To provide an understanding of robot maneuverability, holonomic constraints, and trajectory-following control strategies.
- To inculcate the principles of dynamic modeling for differential-drive and omni directional mobile robots using Lagrange methods.
- To develop the ability to classify sensors, characterize performance, and represent environmental uncertainty using statistical methods.

UNIT I INTRODUCTION TO MOBILE ROBOTS

9

Introduction – Locomotion of the Robots – Key Issues on Locomotion – Legged Mobile Robots – Configurations and Stability – Wheeled Mobile Robots – Design Space and Mobility Issues – Unmanned Aerial and Underwater Vehicles – Teleportation and Control

UNIT II MOBILE ROBOT KINEMATICS

9

Introduction; kinematic models and constraints: representing robot position, forward kinematic models, wheel kinematic constraints: fixed, caster and omni wheels, robot kinematic constraints, examples: robot kinematic models and constraints.

UNIT III MOBILE ROBOT MANEUVERABILITY

9

Degree of mobility, degree of steerability, robot maneuverability; mobile robot workspace: degrees of freedom, holonomic robots, path and trajectory considerations; motion control (kinematic control): open loop control (trajectory following), feedback control.

UNIT IV MOBILE ROBOT DYNAMICS

9

Introduction, general robot dynamic modeling - Newton-Euler and Lagrange, differential-drive Wheeled mobile robot, three-Wheel omni directional mobile robot, four mecanum-wheel omni directional robot.

UNIT V SENSORS FOR MOBILE ROBOTS

9

Sensor classification, characterizing sensor performance, wheel/motor sensors, heading sensors, ground-based beacons, active ranging, motion/speed sensors, visionbased sensors; representing uncertainty: statistical representation.

TOTAL: 45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Classify various locomotion mechanisms, including legged, wheeled, and aerial configurations, based on stability and design constraints.
- Construct forward kinematic models for mobile robots by accounting for fixed, caster, and omni-wheel constraints.
- Compare holonomic and non-holonomic maneuverability to implement effective trajectory-following and feedback motion control.
- Analyze the dynamic behavior of differential-drive and Mecanum-wheel robots using Newton-Euler and Lagrange formulations.
- Examine sensor performance and statistical uncertainty to determine the most effective sensing suite for robot localization.

TEXT BOOKS

1. Roland Siegwart, Illah R. Nourbakhsh, "Introduction to Autonomous Mobile Robots", MIT Press, Second Edition, 2011.
2. Spyros G. Tzafestas, "Introduction to Mobile Robot Control", Elsevier, Second Edition, 2014.

REFERENCES

1. Gregory Dudek, Michael Jenkin, "Computational Principles of Mobile Robotics", Cambridge University Press, Third Edition, 2023..
2. George A. Bekey, "Autonomous Robots", MIT Press, First Edition, 2005..

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/112/106/112106298/> -(Wheeled mobile Robots)
2. <https://www.mathworks.com/help/robotics/> - (Robotics System Toolbox)

Mapping of COs-POs& PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	2	2	1	1	1	1	-	1	-	-
2	3	3	3	2	3	1	1	1	1	-	1	-	-
3	3	3	3	3	3	1	1	1	2	-	2	-	-
4	3	3	3	3	3	1	1	1	2	-	2	-	-
5	3	3	3	3	3	2	1	1	2	-	2	-	-
AVG.	3	3	2.8	2.6	2.8	1.2	1	1	1.6	-	1.6	-	-

1-Low 2-Medium 3-High '-' – No Correlation.

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23CS0711

INTRODUCTION TO CYBER SECURITY

L T P C
3 0 0 3

OBJECTIVES

- To impart fundamental knowledge of cyber security concepts, cyber threats and risk management frameworks.
- To provide knowledge about computer networking fundamentals, secure protocols, and defensive mechanisms.
- To impart understanding of cryptographic techniques, hashing, digital signatures, PKI, and data security practices.
- To develop students understanding on common cyber threats, malware, web-based attacks, and appropriate mitigation approaches.
- To familiarize the students with regulatory compliance standards, security practices and cloud security.

UNIT I FUNDAMENTALS OF CYBER SECURITY

9

Introduction to Cyber Security - Information Security - CIA Triad - Cyber Space - Digital Identity - Threats and Vulnerabilities - Risk Management - Types of Hackers - Cyber Crimes - Security Policies.

UNIT II NETWORK SECURITY

9

Computer Networks - OSI Model - TCP/IP Model - IP Addressing - DNS and DHCP - Firewalls - IDS and IPS - VPN - Secure Communication Protocols - Network Attacks - Wireless Security.

UNIT III CRYPTOGRAPHY AND DATA SECURITY

9

Introduction to Cryptography - Encryption and Decryption - Symmetric Cryptography - Asymmetric Cryptography - AES - RSA - Hash Functions - Digital Signatures - Public Key Infrastructure (PKI) - Data Security.

UNIT IV CYBER THREATS AND MALWARE

9

Cyber Attacks - Malware - Viruses - Worms - Trojans - Ransomware - Phishing - Social Engineering - SQL Injection - Cross-Site Scripting (XSS) - DoS and DDoS Attacks.

UNIT V CYBER LAWS AND SECURITY PRACTICES

9

Cyber Ethics - Information Technology Act, 2000 - Cyber Laws - Digital Privacy - Password Security - Multi-Factor Authentication - Incident Response - Disaster Recovery - Cloud Security - Artificial Intelligence in Cyber Security.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of this course, students will be able to:

- Explain fundamental cyber security concepts and apply basic risk management frameworks to identify security risks.
- Apply computer networking fundamentals, secure protocols, and defensive mechanisms to protect networked systems.
- Apply cryptographic techniques, hashing mechanisms, and data security methods to ensure information and ensure data security
- Analyze malware infections, system vulnerabilities, and web-based attacks and recommend appropriate mitigation measures.
- Analyze regulatory compliance requirements, Cyber Laws, and cloud security practices for securing digital environments.

TEXT BOOKS

1. William Stallings, "Cryptography and Network Security: Principles and Practice", Pearson Education, 8th Edition, 2020.
2. AnandShinde, "Introduction to Cyber Security Guide to the World of Cyber Security", Notion Press, 2021.

REFERENCES

1. Chwan-Hwa (John) Wu and J. David Irwin, "Introduction to Computer Networks and Cyber Security", CRC Press, 2016.
2. Nina Godbole and SunitBelapure, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India, 2011.

E-RESOURCES

1. https://onlinecourses.swayam2.ac.in/e-learning/preview/nou19_cs08
2. <https://nptel.ac.in/courses/106106248>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	1	-	-	2	-	2	1	2	-	-	-
2	3	3	3	2	3	-	-	-	2	2	-	-	-
3	3	3	3	2	2	-	-	-	1	1	-	-	-
4	3	3	3	3	3	1	-	-	2	2	-	-	-
5	3	2	2	2	2	3	2	3	2	3	2	-	-
AVG.	3.0	2.6	2.4	2.3	2.5	2.0	2.0	2.5	1.6	2.0	2.0	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Don
Chairman - BoS





23PMO706

**INTELLECTUAL PROPERTY RIGHTS FOR
PHARMA INDUSTRY**

**L T P C
3 0 0 3**

OBJECTIVES

- To introduce the basic concepts of Intellectual Property Rights (IPR), their protection mechanisms, and their significance in the pharmaceutical industry.
- To familiarize students with patent laws, copyright regulations, international treaties, and their role in protecting intellectual property in the pharmaceutical sector.
- To provide knowledge of patent filing, prior art search, patent applications, and international patenting for pharmaceutical innovations.
- To develop an understanding of patent administration and legal aspects of patent protection in the pharmaceutical industry.
- To enhance understanding of patent ownership, publication ethics, copyright protection, and intellectual property management in research and academia.

UNIT I INTRODUCTION TO INTELLECTUAL PROPERTY RIGHTS

9

Concept of Intellectual Property Right, The World Intellectual Property Organization, Intellectual property protection (IPP) and intellectual property rights (IPR), Economic importance, mechanisms for protection of intellectual property-patents, copyrights, trademark, Factors affecting choice of IP protection, Penalties for violation, Role of IPR in pharmaceutical industry, Global ramifications and financial implications.

UNIT II RULES AND REGULATIONS

9

The Patents (Amendment) Act, 2002 and The Patents (Amendment) Act, 2005, Rationale of Patent & License, Application for Patents, Rights of Patentee, Compulsory Licenses, Surrender and Revocation of Patents, Infringement of Patents, Amendments, Registration of Lapsed Patents, Patent Agent, Overview of global patents and US, Indian Copyright Law and digital technologies-Berne convention, WIPO copyright treaty (WCT), WIPO performance and Phonogram Treaty (WPPT).

UNIT III PATENT FILING

9

Precautions before patenting-disclosures / non-disclosures, publication-article / thesis, Prior art search-published patents, internet search patent sites, specialized services-search requests, costs, Patent application-forms and guidelines, fee structure, time frames, jurisdiction aspects, Types of patent applications- provisional, non-provisional, PCT and convention patent applications, International patenting-requirement procedures and costs.





UNIT IV FINANCIAL ASSISTANCE FOR PATENTING

9

Introduction to schemes by NRDC and TIFAC, Publication of patents-gazette of India, status in Europe and US, Patent annuity; Patent attorneys-technical aspects, criteria for selection, addresses, fee, rights and responsibilities of a patentee, Patent infringement- meaning, scope, litigation, case studies and examples.

UNIT V RESEARCH, PATENTS, COPYRIGHT, AND TECHNOLOGY TRANSFER

9

Patenting by research students, lecturers and scientists University / organisational rules in India and abroad, Thesis research paper publication, credit sharing by workers, financial incentives, Useful information sources for patents related information-internet sites and periodicals Significance of copyright protection for researchers, Protection for computer data bases, multimedia works.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Apply the principles of IPR to identify appropriate protection mechanisms based on the nature of pharmaceutical innovations and factors influencing IP protection.
- Analyze the patent systems of India and the United States, and evaluate the impact of amendments on patent protection and innovation.
- Describe the methods for conducting prior art searches using patent databases and online search resources.
- Explain the objectives of NRDC and TIFAC schemes and the patent publication process in India, Europe, and the United States.
- Implement patenting procedures and institutional policies in academic and research environments.

TEXT BOOKS

1. Bayya subba rao . V. Appaji, "Intellectual Property Rights in Pharmaceutical Industry" PharmaMed Press, Second Edition ,2025.
2. Prof. Rupinder Tewari Ms. Mamta Bhardwaj," Intellectual Property", Publication Bureau Panjab University , Forth Edition ,2019.

REFERENCES

1. Harshal Ashok Pawar," Intellectual Property Rights and Patents in Pharmacy" Everest Publishing House , First Edition , 2025
2. Anasuya Patil," textbook on Pharmaceutical Intellectual Property Rights", shashwat publication , First Edition, 2016.





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E-RESOURCES

1. <https://www.lexology.com/library/detail.aspx?g=0588408f-f7e2-4c00-aa50-76fcb455b12c>
2. <https://www.lingayasvidyapeeth.edu.in/the-vital-role-of-intellectual-property-rights-ipr-in-pharmacy/>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	1	3	1	1	-	-	1	1	-	-
2	2	2	2	1	3	2	2	-	1	-	-	-	-
3	3	1	2	1	2	1	1	-	-	-	2	-	-
4	2	3	3	2	2	2	1	2	-	1	2	-	-
5	2	3	2	1	1	3	3	2	-	-	2	-	-
AVG.	2.4	2.2	2.2	1.2	2.2	1.8	1.6	2	1	1	1.75	-	-

1-Low 2-Medium 3-High '-' – No Correlation


Chairman - BoS





23MA0710

OPERATIONS RESEARCH

L T P C
3 0 0 3

OBJECTIVES

- To introduce the basic concepts of linear programming.
- To provide knowledge of duality and network models.
- To explain the concepts of integer programming.
- To explore the techniques of classical optimization theory.
- To develop an understanding of the Critical path method and the Program evaluation and review technique.

UNIT I LINEAR PROGRAMMING

9

Principal components of decision problem – Modeling phases – Linear Programming Formulation and graphic solution – Simplex method.

UNIT II DUALITY AND NETWORKS

9

Definition of dual problem – Primal – Dual relationships – Dual simplex methods – Post optimality analysis – Transportation and assignment model – Shortest route problem

UNIT III INTEGER PROGRAMMING

9

Cutting plan algorithm– Branch and bound methods, Multistage (Dynamic) programming.

UNIT IV CLASSICAL OPTIMISATION THEORY

9

Unconstrained external problems, Newton – Raphson method– Equality constraints– Jacobean methods – Lagrangian method–Kuhn–Tucker conditions–Simple problems.

UNIT V OBJECT SCHEDULING

9

Network diagram representation – Critical path method – Time charts and resource leveling– Programme evaluation review technique.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of this course, the students will be able to:

- Solve Linear Programming Problems using graphical and simplex methods.
- Apply duality concepts and network optimization techniques to solve transportation, assignment, and shortest path problems.
- Solve Integer Programming and Dynamic Programming problems using appropriate optimization techniques.
- Analyze unconstrained and constrained optimization problems using classical optimization methods.
- Apply project scheduling techniques such as CPM and PERT for planning, scheduling, and resource optimization.





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TEXT BOOKS

1. H.A. Taha, "Operation Research", Prentice Hall of India, Eighth Edition, 2002.
2. Paneer Selvam, "Operations Research", Prentice Hall of India, Second Edition, 2002.

REFERENCES

1. Vohra, "Quantitative Techniques in Management", Tata Mc Graw Hill, Second Edition, 2002.
2. Winston "Operation Research", Thomson Learning, Fourth Edition, 2003.

E-RESOURCES

1. <https://nptel.ac.in/courses/111/102/111102012/> (Operation Research)
2. <https://freevideolectures.com/course/4737/nptel-project-management/21> (Operation Research)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	1	2	1	-	-	-	-	2	-	-
2	3	3	2	2	2	1	-	-	-	-	2	-	-
3	3	3	3	2	2	1	-	-	-	-	2	-	-
4	3	3	2	2	2	1	-	-	-	-	2	-	-
5	2	3	3	2	2	1	-	-	-	-	2	-	-
AVG.	2.8	3	2.4	1.8	2	1	-	-	-	-	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS





OPEN ELECTIVE III

23CEO717

GEOGRAPHICAL INFORMATION SYSTEM

L T P C
3 0 0 3

OBJECTIVES

- To introduce the fundamental concepts and components of GIS.
- To impart knowledge on spatial data models and database structures.
- To familiarize students with data acquisition, input, and management techniques.
- To instruct GIS analysis and modeling techniques.
- To enhance skills in spatial data interpretation and real-world applications.

UNIT I – INTRODUCTION TO GIS

9

Definition and components of GIS – History and evolution of GIS – Basic concepts of spatial information – Elements of GIS – Hardware, software, data, people and methods – GIS vs conventional mapping – Coordinate systems and map projections – Types of maps – Overview of GIS applications in engineering and resource management.

UNIT II – SPATIAL DATA MODELS AND DATA STRUCTURES

9

Spatial data types – Raster and Vector data models – Comparison between raster and vector models – Spatial data structures – Topology concepts – Attribute data and database management systems – Relational database model – Data storage and retrieval – Metadata concepts – Data quality and accuracy.

UNIT III – DATA ACQUISITION AND INPUT TECHNIQUES

9

Sources of spatial data – Maps, aerial photographs and satellite imagery – GPS data collection – Surveying data integration – Digitization and scanning – Georeferencing – Data editing and transformation – Error sources and correction – Data integration techniques – Spatial data standards.

UNIT IV – GIS ANALYSIS AND MODELING

9

Spatial analysis concepts – Query operations – Buffering and overlay analysis – Network analysis – Terrain analysis and Digital Elevation Model (DEM) – Interpolation techniques – Spatial modeling – Multi-criteria decision analysis – GIS-based modeling applications in urban planning and environmental management.

UNIT V – GIS OUTPUT, VISUALIZATION AND APPLICATIONS

9

Cartographic visualization – Map layout and design – Thematic mapping – Data visualization techniques – Web GIS concepts – Open-source GIS platforms – GIS applications in water resources, transportation, disaster management, urban planning and environmental monitoring – Introduction to GIS project workflow.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Construct the fundamental concepts and components of GIS.
- Analyze spatial data models and database structures.
- Apply data acquisition and preprocessing techniques in GIS.
- Examine the spatial analysis and GIS modeling.
- Analyze GIS outputs, effective spatial visualizations and GIS techniques.

TEXT BOOKS

1. Kang-tsung Chang, "Introduction to Geographic Information Systems", McGraw Hill Education, Ninth Edition, 2022.
2. Ian Heywood, Sarah Cornelius and Steve Carver, "An Introduction to Geographical Information Systems", Pearson Education, Fifth Edition, 2019.
3. Tor Bernhardsen, "Geographic Information Systems: An Introduction", Wiley India, Third Edition, 2018.

REFERENCES

1. Paul A. Longley, Michael F. Goodchild, David J. Maguire and David W. Rhind, "Geographical Information Systems and Science", Wiley, Fourth Edition, 2021.
2. Burrough, P.A. and McDonnell, R.A., "Principles of Geographical Information Systems", Oxford University Press, 2015.
3. Lo, C.P. and Yeung, A.K.W., "Concepts and Techniques of Geographic Information Systems", Prentice Hall, 2018.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc22_ce84/preview (GIS and Remote Sensing)
2. https://onlinecourses.nptel.ac.in/noc20_ce29/preview (GIS Applications)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	-	3	2	-	-	2	2	1	-	-
2	3	2	2	-	3	2	-	-	2	2	1	-	-
3	3	2	2	-	3	2	-	-	2	2	1	-	-
4	3	2	2	-	3	2	-	-	2	2	1	-	-
5	3	2	2	-	3	2	-	-	2	2	1	-	-
AVG.	3	2	2	-	3	2	-	-	2	2	1	-	-

1-Low 2-Medium 3-High '-' – No Correlation

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23CSO715

FUNDAMENTALS OF BLOCKCHAIN TECHNOLOGY

LTPC

3003

OBJECTIVES

- To impart fundamental knowledge of blockchain technology, distributed ledger concepts, and decentralized systems.
- To develop students' understanding of cryptographic techniques, consensus mechanisms, and blockchain architecture.
- To train students in designing and implementing smart contracts using Ethereum and Solidity.
- To familiarize students with blockchain platforms, decentralized applications (DApps), and enterprise blockchain frameworks.
- To expose students to blockchain applications, security challenges, emerging trends, and real-world case studies through practical implementation.

UNIT I INTRODUCTION TO BLOCKCHAIN TECHNOLOGY

9

Introduction to Blockchain – Evolution of Blockchain – Distributed Ledger Technology (DLT) – Characteristics of Blockchain – Blockchain Architecture – Types of Blockchain (Public, Private, Consortium, Hybrid) – Blockchain Components – Blocks, Transactions and Hashes – Merkle Tree – Blockchain Lifecycle – Benefits and Limitations – Blockchain Applications in Various Industries.

UNIT II CRYPTOGRAPHY AND CONSENSUS MECHANISMS

9

Cryptographic Hash Functions – Digital Signatures – Public Key Infrastructure – Elliptic Curve Cryptography – Wallets – Consensus Algorithms – Proof of Work (PoW) – Proof of Stake (PoS) – Delegated Proof of Stake (DPoS) – Proof of Authority (PoA) – Byzantine Fault Tolerance (PBFT) – Mining Process – Blockchain Security.

UNIT III ETHEREUM AND SMART CONTRACTS

9

Ethereum Architecture – Ethereum Virtual Machine (EVM) – Accounts – Gas – Ether – Smart Contracts – Solidity Programming – Variables – Functions – Modifiers – Events – Error Handling – Smart Contract Deployment – Remix IDE – MetaMask – Web3 Basics.

UNIT IV DECENTRALIZED APPLICATIONS AND ENTERPRISE BLOCKCHAIN

9

Decentralized Applications (DApps) – DApp Architecture – IPFS – Hyperledger Fabric – Hyperledger Composer – Corda – Quorum – Blockchain APIs – Blockchain as a Service (BaaS) – Identity Management – Supply Chain Management – Healthcare Applications.

UNIT V BLOCKCHAIN APPLICATIONS AND EMERGING TRENDS

9

Cryptocurrency – Bitcoin Architecture – NFTs – Decentralized Finance (DeFi) – Central Bank Digital Currency (CBDC) – Blockchain in IoT – Blockchain in Artificial Intelligence – Web3 – DA – Blockchain Scalability – Layer-2 Solutions – Security Challenges – Regulatory Issues – Future Trends – Industry Case Studies.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Explain blockchain fundamentals, distributed ledger concepts, blockchain architecture, and applications.
- Analyze cryptographic techniques, digital signatures, wallets, and consensus mechanisms used in blockchain systems.
- Develop smart contracts using Solidity and deploy decentralized applications on Ethereum.
- Analyze enterprise blockchain platforms, decentralized applications, and blockchain integration for real-world business solutions.
- Apply blockchain technologies to develop secure, scalable, and decentralized solutions for modern computing applications

TEXT BOOKS

1. Imran Bashir, "Mastering Blockchain", Packt Publishing, Fourth Edition, 2023.
2. Arshdeep Bahga and Vijay Madisetti, "Blockchain Applications: A Hands-on Approach", VPT Publications, Second Edition, 2017.

REFERENCES

1. Melanie Swan, "Blockchain: Blueprint for a New Economy", O'Reilly Media, First Edition, 2015.
2. Andreas M. Antonopoulos and Gavin Wood, "Mastering Ethereum: Building Smart Contracts and DApps", O'Reilly Media, First Edition, 2018.

E - RESOURCES

1. https://onlinecourses.nptel.ac.in/noc22_cs44/preview (Block chain and its application)
2. https://onlinecourses.nptel.ac.in/noc20_cs01/preview (Introduction to block chain technology and information)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	1	-	2	-	-	-	1	-	2	-	-
2	3	3	2	2	3	-	-	-	1	-	2	-	-
3	3	3	3	2	3	-	-	-	1	-	2	-	-
4	3	2	3	2	3	-	-	-	1	-	2	-	-
5	2	2	2	2	3	-	-	-	1	-	2	-	-
AVG.	2.8	2.4	2.2	2.0	2.8	-	-	-	1.0	-	2.0	-	-

1-Low, 2-Medium, 3-High, "-" – No Correlation

Chairman - BoS





23ECO718

VLSI DESIGN

LT P C

3 0 0 3

OBJECTIVES

- To explain the fundamentals of CMOS circuits and their characteristics.
- To realize MOS based circuits using different design styles
- To impart knowledge on adder, multiplier, and shifter circuits for realizing data path design.
- To understand memory architectures, peripheral circuits and SRAM/DRAM design concepts for high-speed VLSI memory systems.
- To gain knowledge of the testing processes of CMOS circuits.

UNIT I MOS TRANSISTOR

9

MOS operating modes, Pass transistors, Characteristics of CMOS inverter, Scaling principles and fundamental limits. Propagation Delays, CMOS inverter scaling, Elmore's constant.

UNIT II MOS CIRCUIT DESIGN STYLES

9

Static: Static CMOS, Pass transistor, Transmission gate, Pseudo NMOS design Styles, Dynamic: C2MOS, Dynamic, Domino, NORA, and Zipper design styles.

UNIT III DATA PATH DESIGN

9

Adder: CLA adder, MODL, Manchester carry chain, High-speed adders: carry skip, carry select and carry save, Multipliers and shifter: Array multiplier and barrel shifter.

UNIT IV MEMORY DESIGN AND PERIPHERAL CIRCUITS

9

Memory architectures- ROM, 6T SRAM, 1T and 3T DRAM. Memory Peripheral Circuits Address Decoder, Sense Amplifier, Voltage References, Timing and Control, Drivers, Case Study – 4Mbit SRAM.

UNIT V CMOS TESTING

9

CMOS Testing, Need for Testing, Test Principles, Design Strategies for Test, Chip Level and Board Level Test Techniques.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Explain pass transistor operation, propagation delay and Elmore's constant.
- Analyze different MOS circuit design styles.
- Design adder, multiplier and shifter circuits using MOS logic.
- Examine the memory peripheral circuits in SRAM and DRAM design.
- Analyze the design strategies and concepts of testing.

TEXT BOOKS

1. N.Weste, K.Eshraghian, "Principles of CMOS VLSI DESIGN", A system Perspective Addison Wesley, Second Edition, 2004.
2. Jan Rabaey, Anantha Chandrakasan, B.Nikolic, "Digital Integrated circuits: A Design Perspective", Prentice Hall of India, Second Edition, 2003.

REFERENCES

1. A.Pucknell, Kamran Eshraghian, "BASIC VLSI DESIGN", Prentice Hall of India, Third Edition, 2007.
2. John P. Uyemura, "Introduction to VLSI Circuits and Systems", Wiley India Pvt. Ltd.

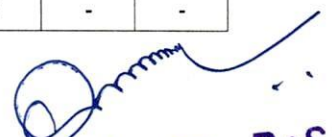
E-RESOURCES

1. https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_ee09 - (CMOS digital VLSI design)
2. https://nptel.ac.in/courses/117101004?utm_source=chatgpt.com - (ADVANCED VLSI DESIGN)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	2	2	1	1	-	1	1	1	-	-
2	3	3	3	2	2	1	1	-	1	1	1	-	-
3	3	3	3	2	2	2	1	-	1	1	1	-	-
4	3	3	3	2	2	2	1	-	1	1	1	-	-
5	3	3	3	2	2	2	1	-	1	1	1	-	-
AVG.	3	3	3	2	2	1.6	1	-	1	1	1	-	-

1-Low 2-Medium 3-High '-' - No Correlation


Chairman - BoS





23EE0716

ELECTRICAL, ELECTRONIC AND MAGNETIC MATERIALS

L T P C

3 0 0 3

OBJECTIVES

- To impart knowledge on dielectric materials and their electrical properties.
- To familiarize with magnetic materials and their characteristics for electrical applications.
- To acquire knowledge on semiconductor materials and superconductivity concepts.
- To enhance understanding of materials used in electrical engineering applications.
- To foster awareness of optical and optoelectronic materials and their applications.

UNIT I DIELECTRIC MATERIALS

9

Dielectric as Electric Field Medium, leakage currents, dielectric loss, dielectric strength, breakdown voltage, breakdown in solid dielectrics, flashover, liquid dielectrics, electric conductivity in solid, liquid and gaseous dielectrics, Ferromagnetic materials, properties of ferromagnetic materials in static fields, spontaneous, polarization, curie point, anti-ferromagnetic materials, piezoelectric materials, pyroelectric materials.

UNIT II MAGNETIC MATERIALS

9

Classification of magnetic materials, spontaneous magnetization in ferromagnetic materials, magnetic Anisotropy, Magnetostriction, diamagnetism, magnetically soft and hard materials, special purpose materials, feebly magnetic materials, Ferrites, cast and cermet permanent magnets, ageing of magnets. Factors effecting permeability and Hysteresis

UNIT III SEMICONDUCTOR MATERIALS

9

Properties of semiconductors, Silicon wafers, integration techniques, Large and very large scale Integration techniques. Concept of superconductivity; theories and examples for high temperature superconductivity; discussion on specific superconducting materials; comments on fabrication and engineering applications.

UNIT IV MATERIALS FOR ELECTRICAL APPLICATIONS

9

Materials used for Resistors, rheostats, heaters, transmission line structures, stranded conductors, bimetallic fuses, soft and hard solders, electric contact materials, electric carbon materials, thermocouple materials. Solid, Liquid and Gaseous insulating materials, Effect of moisture on insulation.





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UNIT V OPTICAL AND OPTOELECTRONIC MATERIALS

9

Principles of photoconductivity - effect of impurities - principles of luminescence-laser principles - He-Ne, injection lasers, LED materials - binary, ternary photoelectronic materials - LCD materials - photo detectors - applications of optoelectronic materials - optical fibres and materials - electro optic modulators - Kerr effect - Pockels effect.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Explain the properties and behavior of dielectric materials.
- Apply the characteristics of magnetic materials in electrical applications.
- Analyze semiconductor materials and superconducting phenomena.
- Examine the selection of materials for electrical engineering applications.
- Analyze the principles and applications of optical and optoelectronic materials.

TEXT BOOKS

1. Pradeep Fulay, "Electronic, Magnetic and Optical materials", CRC Press, Taylor and Francis, Second Edition, 2017.
2. R K Rajput, "A course in Electrical Engineering Materials", Laxmi Publications, 2009.

REFERENCES

1. T K Basak, "A course in Electrical Engineering Materials", New Age Science Publications, 2009.
2. S. P. Seth, P. V. Gupta, "A course in Electrical Engineering Materials", Dhanpat Rai & Sons, 2011.

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/108/104/108104087/> - (Electromagnetic Theory).
2. https://onlinecourses.nptel.ac.in/noc24_ee125/preview - (A Basic Course on Electric and Magnetic Circuits).

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	3	3	-	-	-	-	-	2	-	-
2	3	3	3	3	3	-	-	-	-	-	2	-	-
3	3	3	3	3	3	-	-	-	-	-	2	-	-
4	3	3	3	3	3	-	-	-	-	-	2	-	-
5	3	3	3	3	3	-	-	-	-	-	2	-	-
AVG.	3	3	3	3	3	-	-	-	-	-	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BOS





23MEO720

MARINE VEHICLES

L T P C

3 0 0 3

OBJECTIVES

- To introduce the classification, functions, and applications of various marine vehicles, including commercial vessels and submersibles.
- To provide knowledge on the design, construction, operational principles, and applications of manned and unmanned submersible systems.
- To explain the design concepts, components, control systems, stability, and industrial applications of Remotely Operated Vehicles (ROVs).
- To familiarize students with the design, navigation, sensing technologies, control strategies, and applications of Autonomous Underwater Vehicles (AUVs).
- To develop an understanding of the design considerations, pressure hulls, maneuvering, life-support systems, safety requirements, and certification procedures of manned submersibles.

UNIT MARINE VEHICLES

9

Types – general – by function – commercial marine vehicles- submersibles types – applications.

UNIT II SUBMERSIBLES

9

Manned and unmanned submersibles – towed vehicles – gliders – crawler – Design and construction.

UNIT III REMOTELY OPERABLE VEHICLE (ROV)

9

Remotely Operable Vehicles (ROV) – The ROV business – Design theory and standards – control and simulation – design and stability – components of ROV – applications.

UNIT IV AUTONOMOUS UNDERWATER VEHICLE (AUV)

9

AUV – Design and construction – components – sensors – Navigation -control strategies – applications.

UNIT V MANNED SUBMERSIBLE

9

Introduction – Design and operational consideration – pressure hulls and exostructures – ballasting and trim – maneuvering and control – Life support and habitability – emergency devices and equipment's – certification and classification

TOTAL:45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the classification, functions, and operational characteristics of different marine vehicles and submersibles for various underwater applications.
- Examine the design features, construction methods, and operational capabilities of manned and unmanned submersible systems.
- Compare the design principles, stability, control mechanisms, and functional components of Remotely Operated Vehicles (ROVs) for underwater operations.
- Classify Autonomous Underwater Vehicles (AUVs) based on their design, navigation systems, sensing technologies, control strategies, and marine applications.
- Differentiate the design considerations, life-support systems, maneuvering mechanisms, safety features, and certification requirements of manned submersibles for reliable underwater operations.

TEXTBOOKS

1. Jonathan M. Ross, "Human Factors for Naval Marine Vehicle Design and Operation", CRC Press, First Edition, 2020.
2. Tien Anh Tran, Kolla Bhanu Prakash, Subrata Chowdhury, and Ivan C.K. Tam, "Underwater Vehicle Control and Communication Systems Based on Machine Learning Techniques", CRC Press, First Edition, 2024.
3. Paul A. Russell, Reeds, "General Engineering Knowledge for Marine Engineers", Bloomsbury Publishing (Reeds Marine Engineering and Technology Series), Seventh Edition, 2024.

REFERENCES

1. Ferial L. Hawry (Ed.), "The Ocean Engineering Handbook", CRC Press, First Edition, 2020.
2. Richard A. Geyer (Ed.), Submersibles and Their Use in Oceanography and Ocean Engineering, Elsevier, Revised Edition, 2019
3. Sabiha A. Wadoo and Pushkin Kachroo, "Autonomous Underwater Vehicles: Modeling, Control Design and Simulation", CRC Press, First Edition, 2019.

E-RESOURCES

1. <https://nptel.ac.in/courses/114105030> - (Components of Resistance - I)
2. <https://www.digimat.in/nptel/courses/video/114105030/L22.html> - (Regular Sea Waves - II)





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Mapping of COs-POs &PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	2	3	-	-	-	-	-	-	-	-
2	3	2	2	2	3	-	-	-	-	-	-	-	-
3	3	2	2	2	3	-	-	-	-	-	-	-	-
4	3	2	2	2	3	-	-	-	-	-	-	-	-
5	3	2	2	2	3	-	-	-	-	-	-	-	-
AVG.	3	2	2	2	3	-	-	-	-	-	-	-	-

1-Low 2-Medium 3-High '-' -No Correlation


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23MD0719

WEARABLE TECHNOLOGY

L T P C

3 0 0 3

OBJECTIVES

- To introduce the concepts and applications of wearable healthcare systems.
- To familiarize students with wearable devices and physiological parameter monitoring.
- To impart knowledge on communication technologies used in wearable systems.
- To explore wireless body area networks and healthcare monitoring applications.
- To inculcate understanding of data processing, validation, and analytics in wearable technologies.

UNIT I INTRODUCTION TO WEARABLES

9

Wearable Systems- Need for Wearable Systems, Drawbacks of Conventional Systems for Wearable Monitoring, Types of Wearable Systems, Components of Wearable Systems, Physiological Parameters Commonly Monitored in Wearable Applications, Human body as a heat source for power generation, Hybrid thermoelectric photovoltaic energy harvests, Thermopiles, Sport Application, Smart Fabrics: Intelligent Textiles.

UNIT II WEARABLE DEVICES FOR HEALTHCARE AND VITAL PARAMETERS

9

Vital Parameters Monitored and their Significances, Bio-potential Signal Recordings (ECG, EEG, EMG), Dry Electrodes Design and Fabrication methods, Cuff-less Blood Pressure Measurement, PPG, Galvanic Skin Response (GSR), Body Temperature Measurements, Activity Monitoring for Energy Expenditure, Respiratory parameters, Wearable sensors for Body Temperature: Intermittent and Continuous temperature monitoring, Detection principles – thermistor, infrared radiation, thermopile.

UNIT III COMMUNICATION TECHNOLOGIES

9

Principles of different sensors, Micro-Motors and Communication Channels - Accelerometers, Optical sensor, GPS- Various Input Methods, Power Requirements, Wearable Systems Packaging, Batteries and Charging, Wireless Communication Technologies and Protocols, Receiver Systems.

UNIT IV WIRELESS BODY AREA NETWORKS

9

Wireless Body Area Networks – Introduction, Personal Area Networks (PAN), Application in Vital Physiological Parameter monitoring, Design of Sensor & Sink Nodes, Architecture, Communication & Routing Protocols, Security, Power and Energy Harvesting, Mobile Applications Based Devices.

UNIT V DATA PROCESSING AND VALIDATION

9

Classification Algorithms, Data Mining and Data Fusion, Signal Processing Algorithms in Wearable Applications, Issues of Wearable Physiological Monitoring Systems, Statistical Validation of Parameters, Certifications of Medical Devices and Patenting.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Examine the fundamentals and applications of wearable healthcare systems.
- Select suitable wearable sensors and devices for monitoring physiological signals.
- Apply communication technologies and protocols employed in wearable healthcare systems.
- Discuss wireless body area network solutions for healthcare monitoring applications.
- Analyze the quality of wearable technology data using suitable processing and validation methods.

TEXT BOOKS

1. Haider Raad, "Fundamentals of IoT and Wearable Technology Design", Wiley, First Edition, 2020.
2. Christine Farion, "The Ultimate Guide to Informed Wearable Technology: A Hands-on Approach for Creating Wearables from Prototype to Purpose Using Arduino Systems", Packt Publishing, First Edition, 2022.

REFERENCES

1. Subhas Chandra Mukhopadhyay, Wearable Electronics and Embedded Computing Systems, Springer, First Edition, 2021.
2. Miodrag Bolic, David Simons, and Insook Choi, Wearable Sensors: Theory, Design, and Applications, Academic Press, First Edition, 2023.

E-RESOURCES

1. https://www.youtube.com/watch?v=gp_X_DwoyC4 - (Introduction to Wireless systems).
2. <https://www.youtube.com/watch?v=dm9W5WQUq2A> - (Introduction Wearable device).

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	1	-	-	1	-	-	-	-	1	-	-
2	2	2	3	1	2	-	-	-	-	-	1	-	-
3	2	3	2	1	3	-	-	-	-	-	1	-	-
4	2	2	2	2	2	2	1	-	-	-	1	-	-
5	2	3	1	3	2	-	-	-	-	-	3	-	-
AVG.	2.2	2.4	1.8	1.75	2.25	1.5	1.0	-	-	-	1.4	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation


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23MDO723

MEDICAL WASTE MANAGEMENT

L T P C
3 0 0 3

OBJECTIVES

- To familiarize students with biomedical waste management practices in healthcare facilities.
- To introduce biomedical waste handling, segregation, and transportation procedures.
- To impart knowledge on biomedical waste treatment and disposal technologies.
- To explore biomedical waste regulations, standards, and compliance requirements.
- To inculcate awareness of patient safety and environmental protection measures.

UNIT I HEALTHCARE HAZARD CONTROL AND UNDERSTANDING ACCIDENTS 9

Waste disposal management, Hospital waste management, Biosafety- regulatory framework for GMOs, bioethics and its socio economic impact, hazards associated with poor health care waste management.

UNIT II BIOMEDICAL WASTE HANDLING TECHNIQUES 9

Characterization of medical waste(management and handling) rules, 1998, amendments and guidelines, segregation, packaging, storage, transport of infectious waste. Techniques of biomedical waste management. Health and safety rules. Protocols, issues, and challenges in transportation of biomedical waste.

UNIT III DISPOSAL TECHNIQUES 9

Treatment method- Autoclave, Hydroclave, Microwave, Chemical Disinfection, Solidification and stabilization, Bioremediation, Thermal Conversion Technologies, accumulation and storage of hazardous waste, land disposal of hazardous waste, other treatment and disposal method. Common Hazardous Waste Treatment Facilities (TSDF).

UNIT IV RULES AND CATEGORIES OF WASTE 9

Biomedical waste management rule: Biomedical wastes categories and their segregation, collection, treatment, processing, and disposal options, Standards For Treatment and Disposal Of Bio-Medical wastes, Standards for autoclaving of bio-medical waste, standards of microwaving, standards for deep burial, standards for the efficacy of chemical disinfection, standards for dry heat sterilization, standards for liquid waste.

UNIT V PREVENTION AND PATIENT SAFETY 9

Healthcare Immunizations, Centers for Disease Control and Prevention, Disinfectants, Sterilants, and Antiseptics, OSHA Bloodborne Pathogens Standard, Tuberculosis, Healthcare Opportunistic Infections, Medical Waste. Patient Safety: An Organizational Function, Errors and Adverse Events, Safety Cultures.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Examine biomedical waste management practices in healthcare facilities.
- Apply biomedical waste handling and transportation procedures.
- Analyze biomedical waste treatment and disposal techniques.
- Utilize biomedical waste management regulations and standards in healthcare settings.
- Develop safety measures for patient protection and environmental sustainability.

TEXT BOOKS

1. NehaSuyal , Prasenjit Debbarma , Manali Singh ,Anita Mishra, Roop S Bora, "Biomedical Waste Management: Bioremediation and Recycling", September 2024.
2. Dr. Shivakumar M.A, "Law Relating to Bio-medical Waste Management With Special Reference to Bangalore Urban City", BlueRose Publishers Pvt.Ltd, First Edition,January 2023.

REFERENCES

1. Himadri Panda, "Biomedical Waste: Management, Recycling and Applications", Discovery Publishing House PVT LTD, First Edition, April 2019.
2. NIIR Board of Consultants & Engineers, "Handbook on Recycling and Disposal of Hospital Waste Municipal Solid Waste,Biomedical Waste Plastic Waste", NIIR Project Consultancy Services, January 2018.

E-RESOURCES

1. <https://www.youtube.com/watch?v=32KyVb-Ggn8> – (Biomedical Waste Management System)
2. <https://www.youtube.com/watch?v=hYRp7SDWJXE> - (Mnemonic for Biomedical waste management)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	2	2	1	-	1	3	2	-	-	1	1	-	-
2	2	2	2	1	2	3	2	-	-	1	1	-	-
3	2	3	2	2	2	2	1	-	-	1	1	-	-
4	2	2	2	2	2	3	2	-	-	1	1	-	-
5	2	3	2	2	2	3	3	1	1	2	2	-	-
AVG.	2	2.4	1.8	1.75	1.8	2.8	2	1	1	1.2	1.2	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Chairman - BòS





23MDO724

LIFESTYLE DISEASES

L T P C

3 0 0 3

OBJECTIVES

- To introduce the concepts of lifestyle diseases and their associated risk factors.
- To inculcate awareness on cancer, its types and treatment.
- To impart knowledge on cardiovascular diseases and their causes.
- To familiarize students with types of diabetes, obesity and their preventive measures.
- To explore respiratory diseases, their causes, prevention, and management strategies.

UNIT I INTRODUCTION

9

Lifestyle diseases – Definition ; Risk factors – Eating, smoking, drinking, stress, physical activity, illicit drug use ; Obesity, diabetes, cardiovascular diseases, respiratory diseases, cancer; Prevention – Diet and exercise.

UNIT II CANCER

9

Types – Lung cancer, Mouth cancer, Skin cancer, Cervical cancer, Carcinoma esophagus; Causes Tobacco usage, Diagnosis – Biomarkers, Treatment.

UNIT III CARDIOVASCULAR DISEASES

9

Coronary atherosclerosis – Coronary artery disease; Causes -Fat and lipids, Alcohol abuse -
– Diagnosis - Electrocardiograph, echocardiograph, Treatment, Exercise and Cardiac rehabilitation.

UNIT IV DIABETES AND OBESITY

9

Types of Diabetes mellitus; Blood glucose regulation; Complications of diabetes – Pediatrics and adolescent obesity – Weight control and BMI.

UNIT V RESPIRATORY DISEASES

9

Chronic lung disease, Asthma, COPD; Causes - Breathing pattern (Nasal vs mouth), Smoking – Diagnosis - Pulmonary function testing.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze lifestyle diseases and their associated risk factors.
- Examine diagnostic and treatment approaches for cancer management.
- Utilize diagnostic tools used in cardiovascular disease assessment.
- Apply weight management and diabetes prevention strategies.
- Develop preventive measures and management plans for respiratory diseases.





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TEXT BOOKS

1. MingfuLu, "Solving Lifestyle Disease with Lifestyle", Thorpe Bowker Australia, February 2018.
2. Labros S. Sidossis, Labros S. Sidossis, "Textbook of Lifestyle Medicine", February 2022.

REFERENCES

1. K V Ramani, Hemlatha Ramani, Gunjan Y Trivedi Vishwanathan P Lakshmi M and Anita Verma, "Preventing Insidious Lifestyle Diseases", January 2022.
2. Jeff Lumiri, Cliff Nyambichu, "Lifestyle Diseases: Lifestyle Disease Management" February 2018.

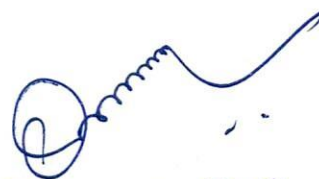
E-RESOURCES

1. <https://youtu.be/6l6gTPIZeOk?si=3GYHWv5itK1unlIc> – (Diagnosis Prognosis)
2. <https://youtu.be/fhL5IAyJz0o?si=GFUtO-FSyShP9gXN> - (Prescribing Asthma and COPD)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	2	3	1	-	1	2	1	-	-	1	1	-	-
2	2	2	2	1	2	2	1	-	-	1	1	-	-
3	2	2	2	2	3	2	1	-	-	1	1	-	-
4	2	2	2	1	2	2	1	-	-	1	2	-	-
5	2	3	2	2	2	3	2	1	1	2	2	-	-
AVG.	2	2.4	1.8	1.5	2	2.2	1.2	1	1	1.2	1.4	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation


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23RA0721

ROBOTIC PROCESS AUTOMATION

L T P C
3 0 0 3

OBJECTIVES

- To introduce the fundamentals and evolution of Robotic Process Automation.
- To develop skills in workflow sequencing, data manipulation, and control flow for automated decision-making.
- To familiarize students with application integration, web scraping methods, and the use of recorders to automate UI actions.
- To develop expertise in exception handling, debugging techniques, and the organization of reusable automation projects.
- To inculcate knowledge of bot deployment using Orchestration Servers, license management, and the current landscape of RPA vendors.

UNIT I INTRODUCTION TO RPA

9

Emergence of Robotic Process Automation (RPA), Evolution of RPA, Differentiating RPA from Automation – Benefits of RPA – Application areas of RPA, Components of RPA, RPA Platforms. Robotic Process Automation Tools – Templates, User Interface, Domains in Activities, Workflow Files.

UNIT II AUTOMATION PROCESS ACTIVITIES

9

Sequence, Flowchart & Control Flow: Sequencing the Workflow, Activities, Flowchart, Control Flow for Decision making. Data Manipulation: Variables, Collection, Arguments, Data Table, Clipboard management, File operations Controls: Finding the control, waiting for a control, Act on a control, UiExplorer, Handling Events

UNIT III APPLICATION INTEGRATION, RECORDING & SCRAPING

9

Application integration strategies, selector usage - key workflow activities ,Recording mouse/keyboard actions -Web scraping from websites and exporting to CSV - Introductory process mining

UNIT IV EXCEPTION HANDLING AND CODE MANAGEMENT

9

Exception handling, Common exceptions, Logging- Debugging techniques, Collecting crash dumps, Error reporting. Code management and maintenance: Project organization, Nesting workflows, Reusability, Templates, Commenting techniques, State Machine.

UNIT V DEPLOYMENT AND MAINTENANCE

9

Publishing using publish utility, Orchestration Server, Control bots, Orchestration Server to deploy bots, License management, Publishing and managing updates. RPA Vendors – Open Source RPA, Future of RPA

TOTAL: 45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Classify RPA platforms and components by differentiating between traditional automation and modern robotic process evolution.
- Build automated workflows using sequences, flowcharts, and data manipulation techniques for effective decision-making.
- Apply recording and web scraping techniques to integrate applications and export data into structured formats.
- Examine exception handling and debugging techniques to ensure robust code management and workflow reusability.
- Analyze deployment strategies using Orchestration Servers to manage bot licensing, publishing, and maintenance updates.

TEXT BOOKS

1. Mary C. Lacity, Leslie P. Willcocks, Robotic Process Automation and Cognitive Automation: The Next Phase, SB Publishing, 2018.
2. NandanMullakara, Robotic Process Automation with UiPath: A Complete Guide, BPB Publications, 2021.

REFERENCES

1. Alok Mani Tripathi), "A practical guide to understanding and implementing RPA with UiPath and other tools."Packt Publishing, Fourth Edition, 2019.
2. Pascal Borner, Ian Barkin, JochenWirtz, Intelligent Automation: Welcome to the World of Hyperautomation, Apress, 2019

E-RESOURCES

1. <https://nptel.ac.in/courses/112101098> -(Robotics)
2. <https://docs.uipath.com/>-(UiPath Documentation)

Mapping of COs-POs& PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	1	2	2	1	–	–	1	1	1	–	–
2	3	3	3	2	3	1	–	–	1	1	1	–	–
3	3	3	3	2	3	1	–	–	1	1	1	–	–
4	3	3	2	3	3	1	–	–	1	1	1	–	–
5	3	3	3	3	3	2	–	–	2	2	2	–	–
AVG.	3	2.8	2.4	2.4	2.8	1.2	–	–	1.2	1.2	1.2	–	–

1-Low 2-Medium 3-High '–' – No Correlation.

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23MAO714

ADVANCED NUMERICAL METHODS

L T P C
3 0 0 3

OBJECTIVES

- To explore techniques for solving algebraic and transcendental equations.
- To introduce numerical techniques for solving matrix inversion and eigenvalue problems.
- To explain the concepts of interpolation and difference equations.
- To provide knowledge of numerical differentiation and integration.
- To explain various numerical methods for solving partial differential equations.

UNIT I SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS 9

Introduction – Basic properties of equations – Transformation of equations – Bisection method – Method of false position – Iteration method – Newton-Raphson Method – Some Deductions From Newton-Raphson Formula.

UNIT II MATRIX INVERSION AND EIGENVALUE PROBLEMS 9

Matrix inversion – Gauss-Jordan method – Factorization method – Partition method – Power method – Jacobi's method.

UNIT III INTERPOLATION AND DIFFERENCE EQUATIONS 9

Spline interpolation – inverse interpolation by Lagrange's method – Definition and order of difference equations – Formation of difference equations – Linear difference equations – Rules for finding the complementary function.

UNIT IV NUMERICAL DIFFERENTIATION AND INTEGRATION 9

Numerical differentiation: Formulae for derivatives – Maxima and minima of a tabulated function – Numerical Integration: Romberg's method – Gaussian integration – Gaussian quadrature for double integral approximation.

UNIT V NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS 9

Finite difference approximations to partial derivatives – Solution of Laplace's equation – Solution of Poisson's equation – Solution of one dimensional heat equation – Hyperbolic equations – Solution of wave equation.

TOTAL: 45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Apply numerical methods to solve algebraic and transcendental equations using iterative techniques.
- Understand the concept of matrix inversion and eigenvalue problems using numerical methods.
- Apply interpolation techniques and solve linear difference equations in numerical analysis.
- Apply numerical differentiation and integration methods to approximate derivatives and definite integrals.
- Analyze partial differential equations using finite difference methods for engineering applications.

TEXT BOOKS

1. Dr.Grewal,B.S., "Numerical Methods in Engineering and Science", Khanna Publishers, Eleventh Edition, 2023.
2. Dr.Kandasamy, P., "Numerical Methods", S.Chand & Company PVT.LTD, Seventeenth Edition, 2016.

REFERENCES

1. Burden, R.L and Faires, J.D, "Numerical Analysis", Cengage Learning, Tenth Edition, 2016.
2. Iyengar, S.R.K and Jain, R.K, "Numerical methods", New Age International (P) Ltd., Publishers, Seventh Edition, 2009.

E-RESOURCES

1. <https://nptel.ac.in/courses/111/107/111107105/> (Numerical Methods)
2. <https://nptel.ac.in/courses/127106019> (Numerical Methods)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	1	2	-	-	-	-	-	2	-	-
2	3	3	2	1	2	-	-	-	-	-	2	-	-
3	3	3	2	1	2	-	-	-	-	-	2	-	-
4	3	3	3	2	2	-	-	-	-	-	2	-	-
5	3	3	3	2	2	-	-	-	-	-	2	-	-
AVG.	3	3	2.4	1.4	2	-	-	-	-	-	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation

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23MGO722

COST MANAGEMENT OF ENGINEERING PROJECTS

L T P C

3 0 0 3

OBJECTIVES

- To familiarize students with the fundamental concepts and processes of strategic cost management.
- To inculcate knowledge of the different stages of project execution and management.
- To enhance knowledge of cost behavior and profit planning in mechanical and process industries.
- To familiarize students with various pricing strategies followed in engineering projects.
- To impart knowledge of various quantitative techniques used in cost management.

UNIT I INTRODUCTION

9

Introduction and overview of the strategic cost management process – Cost concepts in decision making – Relevant cost, Differential cost, Incremental cost and Opportunity cost – Objectives of a Costing System – Inventory valuation – Creation of a database for operational control – Provision of data for decision making.

UNIT II PROJECT

9

Meaning, different types, why to manage, cost overruns centres, various stages of project execution – Conception to commissioning – Project execution as conglomeration of technical and nontechnical activities – Detailed Engineering activities – Pre project execution main clearances and documents – Project team: Role of each member – Importance of project site – Data required with significance – Project contracts – Types and contents – Project execution – Project cost control – Bar charts and network diagram.

UNIT III PROJECT COMMISSIONING

9

Mechanical and process – Cost Behavior and Profit Planning – Marginal Costing – Distinction between marginal costing and absorption costing – Break-even Analysis – Cost volume-Profit Analysis – Various decision-making problems – Standard Costing and Variance Analysis.

UNIT IV PRICING STRATEGIES

9

Pareto Analysis – Target costing – Life cycle costing – Costing of service sector – Just-in-time approach – Material requirement planning – Enterprise resource planning – Total quality management and theory of constraints – Activity-based cost management – Bench marking – Balanced score card and value-chain analysis – Budgetary control – Flexible budgets – Performance budgets – Zero-based budgets – Measurement of divisional profitability pricing decisions including transfer pricing.

UNIT V QUANTITATIVE TECHNIQUES FOR COST MANAGEMENT

9

Quantitative techniques for cost management – Linear programming – PERT/CPM – Transportation problems – Assignment problems – Simulation – Learning curve theory.

TOTAL: 45 PERIODS





OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the basics of the cost management process.
- Examine the stages of project execution from conception to commissioning.
- Construct suitable analytical techniques for project commissioning.
- Examine various pricing strategies followed in project implementation.
- Analyze different quantitative techniques used for cost management.

TEXT BOOKS

1. Charles T. Horngren, Srikant M. Datar and Madhav V. Rajan, "Cost Accounting A Managerial Emphasis", Pearson Education, Fourteenth Edition, 2023.
2. Charles T. Horngren and George Foster, "Advanced Management Accounting", Pearson Education, Thirteenth Edition, 2020.
3. QiuGuo Lin, "Cost management of engineering project", China Electric Power Press, Seventh Edition, 2021.

REFERENCES

1. Robert S Kaplan, Anthony A. Alkinson, "Management Accounting", Pearson Education, Fourth Edition, 2022.
2. Ashish K. Bhattacharya, "Principles & Practices of Cost Accounting", PHI Learning Private Limited, Sixth Edition, 2020.
3. Kenneth K Humpheys, "Project and cost engineers" handbook (cost management), CRC Press, Fourth Edition, 2023.

E-RESOURCES

1. <https://nptel.ac.in/courses/105/106/105106149/> (Types of Projects)
2. <https://nptel.ac.in/courses/110/104/110104073/> (Cost Management for Projects)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	1	1	1	1	-	-	-	3	1	-	-
2	2	2	2	1	1	1	1	1	1	3	1	-	-
3	2	2	3	2	2	1	-	1	1	2	2	-	-
4	2	2	2	1	1	1	-	-	1	3	1	-	-
5	2	3	2	2	2	1	-	-	-	3	1	-	-
AVG.	2	2.2	2	1.4	1.4	1	1	1	1	2.8	1.2	-	-

1-Low 2-Medium 3-High '-' – No Correlation

S. Subash
Chairman - BOS





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23NCCL01

GENERAL ELECTIVES NCC AIRFORCE LEVEL-1 (Common to All UG Programme NCC Students)

L T P C
3 0 0 3

OBJECTIVES

- To familiarize students with the organizational structure of the National Cadet Corps (NCC), the duties and responsibilities of cadets, the incentives offered, and the significance of various NCC camps.
- To impart knowledge on personality development by enhancing communication skills, self-awareness, creative thinking, critical thinking, and leadership qualities.
- To introduce students to the qualities of effective leadership through the study of eminent leaders, their contributions, and the values required for responsible citizenship.
- To inculcate a sense of social responsibility by encouraging active participation in community service activities and promoting awareness of the role of youth in nation-building.
- To provide an understanding of the importance of health, hygiene, yoga, environmental cleanliness, and obstacle training while motivating students to contribute towards the vision of a Clean India.
- To provide practical training in foot drill, rifle drill, ceremonial drill, and social service activities for developing discipline, teamwork, leadership, and a sense of community responsibility.

UNIT I NCC GENERAL

7

Aims, objectives and Organization of NCC - incentives - duties of NCC Cadets - NCC camps - types - conduct.

UNIT II PERSONALITY DEVELOPMENT

7

Personality Development – Factors - Self Awareness - Communication skills –Empathy - Critical and Creative thinking - Decision making.

UNIT III LEADERSHIP

7

Leadership Capsule - Traits - Case studies - Leaders like APJ Abdul Kalam, RatanTata, shivaji, Tipu Sultan, Rabindranath Tagore, N Narayana murthy

UNIT IV SOCIAL SERVICE

7

Social Service Capsule – Basics - Rural development programmes – NGOs -Contribution of Youth - Swatch Bharath Abhiyan, Social evils - Drug Abuse - Digital Awareness - Waste Management - Women Health and Sanitation - Tree Plantation -Traffic Awareness - Pollution.

UNIT V HEALTH AND HYGIENE

7

Hygiene and sanitation – First Aid – Introduction to Yoga – Adventure – Environmental





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awareness and conservation – Obstacle Training – Adventure.

PRACTICAL COMPONENT

10

S.No.	Name of the Experiment	CO Mapping	RBT
1	Foot Drill	CO1	Apply
2	Rifle Drill	CO1	Apply
3	Ceremonial Drill	CO2	Understand
4	Social Service and Community Development	CO4	Understand

TOTAL: 35+10= 45 PERIODS

OUTCOMES

Upon the completion of this course, the students will be able to:

- Explain the organizational structure of the NCC, the roles and responsibilities of cadets, and the significance of various NCC camps.
- Apply communication, self-awareness, and creative and critical thinking skills to demonstrate personality development and confidence.
- Analyze the leadership qualities and contributions of eminent leaders to develop effective leadership skills and responsible citizenship.
- Demonstrate social responsibility by participating in community service activities and promoting awareness of national development initiatives.
- Apply the principles of health, hygiene, yoga, environmental cleanliness, and obstacle training to maintain personal well-being and develop physical fitness.
- Demonstrate proficiency in foot drill, rifle drill, ceremonial drill, and social service activities by applying discipline, teamwork, leadership, and community service skills in practical situations.

TEXT BOOKS

1. Cadet Hand Book(Common Subjects),published by DG NCC.
2. Cadet Hand Book(Specialized Subjects),published by DG NCC.
3. ANO Handbook

REFERENCE BOOKS

1. Grooming tomorrow's Leaders, published by DG NCC.
2. Youth in Action, published by DGNCC.
3. The Cadet, Annual Journal of the NCC.
4. Précis Issued by respective Service Head quarters on specialized subject available to PI Staff as reference material.





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E-RESOURCES

1. <https://www.indiancc.nic.in>
2. <https://www.indiancc.mygov.in>
3. <https://www.play.google.com/MY IAF>
4. <https://www.play.google.com/DGNCC Training>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	3	3	2	2	-	2	-	-
CO2	2	3	2	-	-	3	2	3	3	3	2	-	-
CO3	2	3	2	2	-	3	3	2	2	2	2	-	-
CO4	3	2	2	2	-	3	3	2	3	2	2	-	-
CO5	3	2	2	2	2	3	3	2	-	-	2	-	-
CO6	2	2	3	-	-	3	3	3	3	2	2	-	-
AVG.	2.5	2.3	2.2	2.0	2.0	3.0	2.8	2.3	2.6	2.25	2.0	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Chairman - BoS





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23NCCL02

NCC AIRFORCE LEVEL- 2 (Common to All UG Programme NCC Students)

L	T	P	C
3	0	0	3

OBJECTIVES

- To familiarize students with the concepts of national security, national integration, and threats to the nation.
- To impart knowledge on leadership development, problem-solving techniques, emotional management, and time management skills.
- To introduce the principles of disaster management and encourage active participation in disaster response and relief activities.
- To inculcate an understanding of the significance of airmanship, air campaigns, and the role of the Indian Air Force in national service.
- To provide an insight into aeromodelling and its applications in aviation, while motivating students to explore the Armed Forces as a career.
- To impart practical knowledge of weapon assembling and reassembling while emphasizing safe handling procedures and operational efficiency.

UNIT I NATIONAL INTEGRATION AND AWARENESS

7

National Integration and Awareness - importance and necessity-factors affecting National integration-Unity in Diversity-Threats to National Security.

UNIT II PERSONALITY DEVELOPMENT

7

Problem solving - Group discussions-Coping with stress and emotions-Change your mindset- Time management-Social skills-Team work-public speaking.

UNIT III DISASTER MANAGEMENT

7

Disaster Management Capsule – Organization - Types -Essential services – Assistance - Civil Defence Organization - Initiative training-organizing skills - Dos and Don't's Fire Services and Fire Fighting.

UNIT IV GENERAL SERVICE KNOWLEDGE ON AIRCRAFT AND AIRMANSHP

7

Armed forces and IAF Capsule-Modes of Entry in IAF-Aircraft types, capabilities and role-Air Campaigns-Principle of Flight-Forces acting on Aircraft-Airmanship – Navigation.

UNIT V AEROMODELLING

7

Introduction and Types of Aero Engine–Aircraft Controls–Introduction to Radars–Aero modelling capsule – Flying/Building of Aero models – Micro Light Flying – Simulator Flying.





PRACTICAL COMPONENT

10

S.No.	Name of the Experiment	CO Mapping	RBT
1	Foot Drill	CO1	Apply
2	Rifle Drill	CO1	Apply
3	Weapon Assembling and Reassembling	CO2	Apply
4	Basics of Aero modelling	CO5	Understand

TOTAL: 35+10= 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Apply the principles of national integration to explain the threats and factors affecting national security.
- Analyze the role of public speaking skills and problem-solving techniques in effective leadership and decision-making.
- Explain the types of disasters and the appropriate emergency response measures.
- Analyze the role of the Indian Air Force, aircraft, and airmanship in ensuring national security and defence.
- Apply the concepts of aeromodelling and radar handling to demonstrate an understanding of aircraft operations and flying principles.
- Analyze the importance of drill, weapon training, and aero modelling in developing leadership, teamwork, and military skills.

TEXT BOOKS

- Cadet Hand Book(Common Subjects),published by DG NCC.
- Cadet Hand Book(Specialized Subjects),published by DG NCC.
- ANO Hand Book





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REFERENCES

- Grooming tomorrow's Leaders, published by DG NCC.
- Youth in Action, published by DG NCC.
- The Cadet, Annual Journal of the NCC.
- Précis Issued by respective Service Head quarters on specialized subject available to PI Staff as reference material.

E-RESOURCES

1. <https://www.indiancc.nic.in><https://www.indiancc.mygov.in>
2. https://www.play.google.com/MY_IAFs
3. https://www.play.google.com/DGNCC_Training

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	3	3	2	2	-	2	-	-
CO2	2	3	2	-	-	3	2	3	3	3	2	-	-
CO3	2	3	2	2	-	3	3	2	2	2	2	-	-
CO4	3	3	2	2	2	3	2	2	-	-	2	-	-
CO5	3	2	2	3	3	2	2	2	-	-	2	-	-
CO6	2	2	3	-	-	3	3	3	3	2	2	-	-
AVG.	2.5	2.5	2.2	2.3	2.5	2.8	2.5	2.3	2.5	2.3	2.0	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

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23NCCL03

NCC ARMY WING LEVEL-3
(Common to All UG Programme NCC Students)

L T P C
3 0 0 3

COURSE PREREQUISITES: 75% Attendance in First Year of NCC Course

OBJECTIVES

- To learn the basic structure of NCC and its organization, Incentives, duties of Cadets; imbibe the knowledge of various types of Camp.
- To motivate the cadets as confidence leaders by refining their personality and self-awareness, with the help of Communication skills and aware of creative, critical thinking abilities.
- To create an awareness on Military History and great heroes of India and to know about the important military operations
- To inspire the cadets to take part in the Social Service Activities and also to learn about the infantry battalion
- To acquire knowledge about the basics of health and hygiene, yoga, environment cleanliness and motivate young Indians towards the path of clean India and acquaint about obstacle training.
- To develop discipline, confidence, alertness, and coordination through the practice of basic foot drill movements and commands.

Unit I NCC GENERAL

7

Aims, objectives and Organization of NCC-incentives-duties of NCC Cadets-NCC camps- types - conduct.

Unit II PERSONALITY DEVELOPMENT

7

Personality Development -Factors-Self Awareness-Communication skills-Empathy-Critical and Creative thinking-Decision making.

Unit III MILITARY HISTORY

7

Military History-Biographies, Heroes Study of Battles of Indo-Pak War 1965,1971-Operation Meghdootand Kargil.

Unit IV SOCIAL SERVICE & INFANTRY BATTALION

7

Social Service Capsule-Basics-Rural development programmes-NGOs-Contribution of Youth - Swatch Bharat hAbhiyan, Social evils-Drug Abuse-Digital Awareness-Waste Management-Women Health and Sanitation-Organisation of Infantry, characteristics

UnitV HEALTH AND HYGIENE

7

Hygiene and sanitation – First Aid – Introduction to Yoga – Adventure – Environmental awareness and conservation – Obstacle Training -Adventure

TOTAL: 35 PERIODS





OUTCOMES

Upon the completion of the course, the students will be able to:

- Understand the basic organization of NCC and roles, responsibilities of cadets for the smooth functioning of all camps
- Develop the cadets personality and to think divergently to break functional fixedness
- Identify the Leadership traits of military heroes and learn about their organization
- Understand the concept and important of Social service and evolution of infantry battalion
- Practice healthy practices to improve the personal sanitation and hygiene and get into the adventurous activities
- Execute drill procedures effectively while maintaining military etiquette, discipline, and coordination during parades.

TEXT BOOKS

1. Cadet Hand Book (Common Subjects), published by DGNCC.
2. Cadet Hand Book (Specialized Subjects), published by DGNCC.
3. ANO Handbook

REFERENCES

1. Grooming tomorrow's Leaders, published by DG, NCC.
2. Youth in Action, published by DG, NCC.
3. The Cadet, Annual Journal of the NCC.
4. Précis Issued by respective Service Headquarters on specialized subject available to PI Staff as reference material.

E - RESOURCES

1. <https://www.indiancc.nic.in>
2. <https://www.indiancc.mygov.in>
3. https://www.play.google.com/MY_IAF
4. https://www.play.google.com/DGNCC_Training

LIST OF DRILLS (Common to All UG Programme NCC Students)

1. Foot Drill
2. Rifle Drill
3. Ceremonial Drill
4. Social Service and Community Development

TOTAL = 10 PERIODS





Mapping of Cos-Pos& PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	2	2	-	-	-	2	-	3	2	2	1	-	-
2	-	2	-	-	-	2	-	2	3	3	2	-	-
3	2	2	-	-	-	3	-	3	3	2	3	-	-
4	-	2	2	-	-	3	3	3	2	2	2	-	-
5	2	2	-	-	-	3	3	2	2	1	2	-	-
6	2	2	3	-	-	2	-	2	3	2	2	-	-
AVG.	2	2	2.5	-	-	2.5	3	2.5	2.5	2	2	-	-

1- Low 2-Medium 3-High '-' – No Correlation

U. Dandey
Chairman - BoS





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23NCCL04

NCC ARMY WING LEVEL-4
(Common to All UG Programme NCC Students)

L	T	P	C
3	0	0	3

COURSE PREREQUISITES: 75% Attendance in Second Year of NCC Course

OBJECTIVES

- To realize the importance of national security and threats for the nation and aware of National Integration.
- To create interest in cadet to develop into great leaders by teaching them about problem solving techniques, handling emotions and time management skills.
- To aware of disaster management and motivate the young minds to help during the time of disasters.
- To create a pool of organized, trained and motivated youth with authoritative qualities to serve in CAPF and to know the Modes of CAPF
- To learn about the use of Maps in army, usage of conventional signs, scale and grid systems.
- To develop discipline, confidence, alertness, and coordination through the practice of basic foot drill movements and commands.

Unit I NATIONAL INTEGRATION AND AWARENESS

7

National Integration and Awareness - importance and necessity-factors affecting National integration-Unity in Diversity-Threats to National Security.

Unit II PERSONALITY DEVELOPMENT

7

Problem solving - Group discussions-Coping with stress and emotions-Change your mindset-Time management-Social skills-Team work-public speaking.

Unit III DISASTER MANAGEMENT

7

Disaster Management Capsule – Organization - Types -Essential services – Assistance - Civil Defence Organization - Initiative training-organizing skills - Dos and Don'ts Fire Services and Fire Fighting

Unit IV INTRODUCTION TO ARMED FORCES

7

Army-Police and Central Armed Police Forces – Badges - Role- Tasks-Modes of Entry into Army, Police and CAPF.

Unit V MAPS, CONVENTIONAL SIGNS, SCALE AND GRID SYSTEMS

7

Conventional Signs- Scales and Grid Systems – Topographical Forms and Technical Terms, Cardinal Points and Types of North-Types of Bearing and use of service protractor Google Maps & Applications.

TOTAL: 35 PERIODS





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OUTCOMES

Upon the completion of the course, the students will be able to:

- Realize the importance of National integration, threats and factors affecting the National Security.
- Demonstrate their public speaking skills and problem solving techniques.
- Identify and analyze the problems during Disaster type and to give solutions during the emergency periods with their presence of mind
- Grasp the concept of CAPF and its importance to the nation and detailed Knowledge on modes of entry into CAPF.
- Obtain knowledge on maps, usage of conventional signs, learn about the features of land
- Execute drill procedures effectively while maintaining military etiquette, discipline, and coordination during parades.

TEXT BOOKS

1. Cadet Hand Book (Common Subjects), published by DGNCC.
2. Cadet Hand Book (Specialized Subjects), published by DGNCC.
3. ANO Hand Book

REFERENCES

1. Grooming tomorrow's Leaders, published by DG, NCC.
2. Youth in Action, published by DG, NCC.
3. The Cadet, Annual Journal of the NCC.
4. Précis Issued by respective Service Headquarters on specialized subject available to PI Staff as reference material.

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2. <https://www.indiancc.mygov.in>
3. https://www.play.google.com/MY_IAFs
4. https://www.play.google.com/DGNCC_Training

LIST OF DRILLS

(Common to All UG Programme NCC Students)

1. Foot Drill
2. Rifle Drill
3. Weapon Assembling and Reassembling
4. Basics of Maps

TOTAL: 10 PERIODS





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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	2	2	-	-	-	3	2	3	2	2	1	-	-
2	2	2	-	-	-	2	-	3	3	2	2	-	-
3	2	2	2	-	-	3	2	3	3	2	2	-	-
4	2	2	2	-	-	3	-	3	2	2	3	-	-
5	2	2	3	-	2	2	-	3	2	2	2	-	-
6	2	2	3	-	-	2	-	3	3	2	2	-	-
AVG.	2	2	2.5	-	2	2.5	2	3	2.5	2	2	-	-

1- Low 2-Medium 3-High '-' – No Correlation

U. D. D.
Chairman - BoS





ELECTIVE - MANAGEMENT

23MGT701

PRINCIPLES OF MANAGEMENT

L T P C
3 0 0 3

OBJECTIVES

- To familiarize the basic concepts of management, managerial roles, business organizations and management approaches.
- To inculcate the planning process, strategic management concepts and decision-making techniques.
- To provide knowledge of organizational structure, authority relationships and human resource management functions.
- To impart knowledge of motivation, leadership, communication and individual and group behavior in organizations.
- To enhance the concepts of controlling, performance measurement and management control techniques.

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management - Science or Art - Manager Vs Entrepreneur - types of managers - managerial roles and skills - Evolution of Management - Scientific, human relations, system and contingency approaches - Types of Business organization - Sole proprietorship, partnership, company - public and private sector enterprises - Organization culture and Environment - Current trends and issues in Management.

UNIT II PLANNING 9

Nature and purpose of planning - Planning process - Types of planning - Objectives - Setting objectives - Policies - Planning premises - Strategic Management - Planning Tools and Techniques - Decision making steps and process.

UNIT III ORGANISING 9

Nature and purpose - Formal and informal organization - Organization chart - Organization - structure - Types - Line and staff authority - Departmentalization - delegation of authority - Centralization and decentralization - Job Design - Human Resource Management - HR Planning, Recruitment, selection, Training and Development, Performance Management, Career planning and management.

UNIT IV DIRECTING 9

Foundations of individual and group behaviour - Motivation - Motivation theories -Motivational techniques - Job satisfaction - Job enrichment - Leadership - types and theories of leadership - Communication - Process of communication - Barrier in communication -Effective communication - Communication and IT.





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UNIT V CONTROLLING

9

System and process of controlling - Budgetary and non-Budgetary control techniques - Use of computers and IT in Management control - Productivity problems and management - Control and performance - Direct and preventive control - Reporting.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Explain the principles of management, organizational forms and management theories.
- Analyze the planning tools and decision-making techniques in organizational situations.
- Apply the organizational structures and human resource management practices.
- Explain the leadership, motivation and communication approaches for organizational effectiveness.
- Examine the assess control systems and performance management techniques used in organizations.

TEXT BOOKS

1. Stephen P. Robbins and Mary Coulter, "Management", Fourteen Edition Prentice Hall (India) Pvt. Ltd., 2017.
2. Harold Koontz and Heinz Weihrich, "Essentials of management", Eleventh Edition, Tata McGraw Hill, 2020.

REFERENCES

1. Robert Kreitner and Mamata Mohapatra, "Management", Biztantra, 2008.
2. Stephen A. Robbins and David A. Decenzo and Mary Coulter, "Fundamentals of Management", Seventh Edition, Pearson Education", 2011.

E-RESOURCES

1. <https://nptel.ac.in/courses/110107150> - (Principles of Management)
2. <https://nptel.ac.in/courses/110105146> - (Principles of Management)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	-	-	-	-	1	-	-	-	-	-	-	-
2	-	1	1	-	-	-	-	-	-	-	-	-	-
3	1	-	-	2	-	1	-	2	-	1	1	-	-
4	-	1	1	1	2	-	1	2	-	-	-	-	-
5	1	-	-	-	1	1	-	-	3	-	1	-	-
AVG.	1.66	1	1	1.5	1.5	1	1	2	3	1	1	-	-

1-Low 2-Medium 3-High '-' - No Correlation

Chairman - BoS





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23MGT702

TOTAL QUALITY MANAGEMENT

L T P C

3 0 0 3

OBJECTIVES

- To guide students in understanding the philosophies and practices of total quality management.
- To familiarize students with the principles of TQM, including leadership, customer satisfaction, employee involvement, and continuous improvement.
- To introduce students to quality management tools and techniques for process analysis and improvement.
- To explain advanced quality improvement methods and performance measurement techniques used in organizations.
- To guide students in understanding Quality management systems, environmental management Systems and ISO standards for quality and environmental management.

UNIT I INTRODUCTION

9

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Costs of quality.

UNIT II TQM PRINCIPLES

9

Leadership - Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I

9

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS & TECHNIQUES II

9

Control Charts - Process Capability - Concepts of Six Sigma - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.





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UNIT V QUALITY MANAGEMENT SYSTEM

9

Introduction - Benefits of ISO Registration - ISO 9000 Series of Standards – Sector - Specific Standards - AS 9100, TS16949 and TL 9000 - ISO 9001 Requirements – Implementation – Documentation - Internal Audits – Registration - ENVIRONMENTAL MANAGEMENT SYSTEM: Introduction - ISO 14000 Series Standards - Concepts of ISO 14001 - Requirements of ISO 14001-Benefits of EMS.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Examine the concepts, philosophies, frameworks, and customer-focused practices of Total Quality Management.
- Analyze the roles of leadership, employee involvement, continuous improvement, and supplier partnership in achieving organizational excellence.
- Analyze quality management tools and techniques, including Six Sigma, benchmarking, and FMEA, for process improvement and problem-solving.
- Differentiate the applications of Control Charts, Process Capability Analysis, QFD, Taguchi Methods and TPM in quality improvement.
- Compare the requirements and implementation procedures of quality management systems and environmental management systems based on ISO standards.

TEXT BOOKS

1. Dale H. Besterfield, "Total quality Management", Fifth Edition, Pearson Education India, 2019.
2. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2022.
3. John S. Oakland, "Total Quality Management and Operational Excellence: Text with Cases", Fifth Edition, Routledge, 2024.

REFERENCES

1. James R. Evans and William M. Lindsay, "Managing for Quality and Performance Excellence" Twelfth Edition, Cengage Learning, 2023.
2. Poornima M. Charantimath, "Total Quality Management", Fourth Edition, Pearson Education India, 2020.
3. David L. Goetsch and Stanley B. Davis, "Quality Management for Organizational Excellence", Ninth Edition, Pearson, 2022.

E-RESOURCES

1. <https://nptel.ac.in/courses/110104080> - (Total Quality Management)
2. [https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_mg72-\(Total Quality Management II\)](https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_mg72-(Total%20Quality%20Management%20II))





Mapping of COs-POs& PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	-	1	-	-	-	-	-	2	-	-
2	3	2	2	-	1	-	-	-	-	-	2	-	-
3	3	2	2	-	1	-	-	-	-	-	2	-	-
4	3	2	2	-	1	-	-	-	-	-	2	-	-
5	3	2	2	-	1	-	-	-	-	-	2	-	-
AVG.	3	2	2	-	1	-	-	-	-	-	2	-	-

1 - Low 2 - Medium 3 - High '-' - No Correlation

S. S. S.
Chairman - BoS





23MGT703 ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING

LT P C

3 0 0 3

OBJECTIVES

- To introduce managerial economics for effective decision-making.
- To Familiarize students with production and cost concepts to analyse production optimization for business decisions
- To explore pricing decisions under different market structures and pricing objectives.
- To enhance the ability to interpret financial statements.
- To gain knowledge of capital budgeting techniques for investment decisions.

UNIT I DEMAND AND SUPPLY ANALYSIS

9

Managerial Economics – Relationship with other disciplines – Firms: Types, objectives and goals – Managerial decisions – Decision analysis. Demand – Types of demand – Determinants of demand – Demand function – Demand elasticity – Demand forecasting – Supply – Determinants of supply – Supply function -Supply elasticity.

UNIT II PRODUCTION AND COST ANALYSIS

9

Production function – Returns to scale – Production optimization – Least cost input Isoquants – Managerial uses of production function. Cost Concepts – Cost function – Determinants of cost – Short run and Long run cost curves – Cost Output Decision – Estimation of Cost.

UNIT III PRICING

9

Determinants of Price – Pricing under different objectives and different market structures – Price discrimination – Pricing methods in practice.

UNIT IV FINANCIAL ACCOUNTING

9

Balance sheet and related concepts – Profit & Loss Statement and related concepts – Financial Ratio Analysis – Cash flow analysis – Funds flow analysis – Comparative financial statements – Analysis & Interpretation of financial statements.

UNIT V CAPITAL BUDGETING

Investments – Risks and return evaluation of investment decision – Average rate of return – Payback Period – Net Present Value – Internal rate of return.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of this course, the students will be able to:

- Apply the principles of managerial economics for effective business decision-making.
- Analyse production and cost concepts to support production optimization and business decisions.
- Examine pricing decisions under different market structures and pricing objectives.
- Analyse financial statements to evaluate the financial performance of an organization.
- Compare capital budgeting techniques to evaluate investment opportunities and support investment decisions.

TEXTBOOKS

1. P. L. Mehta, "Managerial Economics: Analysis, Problems and Cases", Seventeenth Edition, Sultan Chand & Sons, 2022.
2. S. N. Maheshwari and S. K. Maheshwari, "Financial Accounting", seventh Edition, Vikas Publishing House Pvt. Ltd., 2023.

REFERENCES

1. Dominick Salvatore and Siddhartha K. Rastogi, "Managerial Economics: Principles and Worldwide Applications", Tenth Edition, Oxford University Press, 2024.
2. M. Pandey, Financial Management, Twelfth Edition, Pearson India, 2023.

E-RESOURCES

1. <http://www.digimat.in/nptel/courses/video/110101005/110101005.html>
2. <https://nptel.ac.in/courses/110101131>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	2	2	-	-	-	1	-	1	1	3	1	-	-
2	2	3	2	1	2	1	-	-	1	3	1	-	-
3	2	3	1	-	-	2	1	1	1	3	1	-	-
4	2	3	-	1	2	1	-	-	2	3	1	-	-
5	2	3	2	1	2	2	1	1	1	3	2	-	-
AVG.	2.0	2.8	1.7	1.0	2.0	1.4	1.0	1.0	1.2	3.0	1.2	-	-

1-Low 2-Medium 3-High '-'- No Correlation

S. S. S.
Chairman - BoS





23MGT704

HUMAN RESOURCE MANAGEMENT

LTP C

3 0 0 3

OBJECTIVES

- To introduce the evolution and significance of Human Resource Management in organizations.
- To familiarize students with matching HR demand and supply with internal and external sources.
- To gain knowledge about executive development programs, common practices and benefits.
- To explore career management and mentor–protégé relationships.
- To enable an understanding of performance evaluation methods and feedback.

UNIT I PERSPECTIVES IN HUMAN RESOURCE MANAGEMENT

9

Evolution of human resource management - The importance of the human factor- Challenges - Role of human resource manager Challenges for Human Resource Managers - Trends in Human Resource Policies – Computer Applications in Human Resource Management - Case analysis.

UNIT II HUMAN RESOURCE PLANNING AND RECRUITMENT

9

Importance of Human Resource Planning - Forecasting human resource requirement - matching supply and demand - Internal and External sources -. Recruitment, Selection, Placements, Induction – Case analysis.

UNIT III TRAINING AND EXECUTIVE DEVELOPMENT

9

Training need Analysis– Purpose–Training Evaluation methods–Benefits -Executive development–Self Development – Knowledge Management –Case analysis.

UNIT IV EMPLOYEE ENGAGEMENT

9

Compensation plan-Reward-Motivation–X, Y, Z Theories-Career management - Mentoring- Development of Mentor - Protege relationships.

UNIT V PERFORMANCE EVALUATION AND CONTROL PROCESS

9

Performance Evaluation Methods - types–Feedback-Industry practices. Promotion, Demotion, Transfer and Separation-The control process –Importance –Methods -grievances–Causes- Implications- Redressal Methods – Artificial Intelligence and an Era of Human Resource – Benefits – Challenges - Case analysis

TOTAL:45 PERIODS





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OUTCOMES

Upon completion of the course, the students will be able to:

- Develop the skills needed to understand the significance of Human Resource Management.
- Differentiate internal and external sources of recruitment for effective HumanResource Planning.
- Analyze the effectiveness of HRM practices in supporting the strategic and operational needs of the organizations in a global economy.
- Examine career management and mentoring practices in organizations.
- Analyze performance evaluation methods practice and control processes.

TEXTBOOKS

1. Biswajeet Pattanayak, "Human Resource Management", Seventh Edition, PHI Learning Private Limited, 2025.
2. Dessler, G., & Varkkey, B, "Human Resource Management", Pearson Education India, Seventeenth Edition, 2024.

REFERENCES

1. Aswathappa, K, " Human Resource Management", Tenth Edition, Tata McGraw-Hill Education, 2023.
2. Ivancevich, J. M., "Human Resource Management", McGraw Hill Education, Fourteenth Edition, 2021.

E-RESOURCES

1. https://open.umn.edu/opentextbooks/textbooks/71?utm_source=.com
2. <https://positivepsychology.com/theory-x-and-theory-y/>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	1	-	-	-	1	1	2	2	1	-	2	-	-
2	1	2	-	-	1	1	1	2	1	1	2	-	-
3	1	2	2	2	2	2	2	2	2	2	2	-	-
4	-	2	-	-	-	1	2	3	2	1	2	-	-
5	1	2	1	2	2	1	2	2	2	2	2	-	-
AVG.	1	2	1.5	2	1.5	1.2	1.8	2.2	1.6	1.5	2	-	-

1-Low 2-Medium 3-High '-' - No Correlation

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23MGT705

KNOWLEDGE MANAGEMENT

L T P C

3 0 0 3

OBJECTIVES

- To introduce the concepts, evolution, challenges, and ethical aspects of Knowledge Management.
- To understand knowledge sharing and tacit knowledge management.
- To explore technologies and tools supporting Knowledge Management.
- To impart knowledge of Knowledge Management strategies and organizational applications.
- To enhance understanding of future trends and case studies in Knowledge Management.

UNIT I INTRODUCTION

9

Introduction – The foundation of Knowledge Management– Cultural issues - technology applications - organizational concepts and processes- management aspects- and decision support systems. The Evolution of Knowledge management - Challenges Facing the Evolution of Knowledge Management - Ethics for Knowledge Management.

UNIT II CREATING THE CULTURE OF LEARNING AND KNOWLEDGE SHARING

9

Organization and Knowledge Management - Building the Learning Organization. Knowledge Markets - Cooperation among Distributed Technical Specialists – Tacit Knowledge and Quality Assurance.

UNIT III TECHNOLOGIES AND TOOLS FOR KNOWLEDGE MANAGEMENT

9

Telecommunications and Networks in Knowledge Management - Internet Search Engines and Knowledge Management - Information Technology in Support of Knowledge Management - Knowledge Management and Vocabulary Control - Information Mapping in Information Retrieval - Information Coding in the Internet Environment - Repackaging Information.

UNIT IV KNOWLEDGE MANAGEMENT STRATEGIES AND APPLICATIONS

9

Knowledge Management Strategy – Components of Knowledge Strategy – Knowledge Acquisition, Storage, Sharing and Application – Knowledge Management Frameworks and Models – Organizational Applications of Knowledge Management – Case Studies on Knowledge Management Practices – Challenges in Implementing Knowledge Management.

UNIT V FUTURE TRENDS AND CASE STUDIES

9

Advanced topics and case studies in knowledge management - Development of a knowledge management map/plan that is integrated with an organization's strategic and business plan - A case study on Corporate Memories for supporting various aspects in the process life -cycles of an organization.

TOTAL: 45 PERIODS





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OUTCOMES

Upon completion of this course, the students will be able to:

- Examine Knowledge Management concepts, challenges and ethical aspects.
- Analyze knowledge sharing and tacit knowledge management practices.
- Apply technologies and tools for effective Knowledge Management.
- Compare Knowledge Management strategies, frameworks, and applications.
- Analyze future trends and case studies in Knowledge Management.

TEXTBOOKS

1. Dalkir, K. "Knowledge Management in Theory and Practice", Fourth Edition, MIT Press, 2023
2. Becerra-Fernandez, I., & Sabherwal, R., "Knowledge Management: Systems and Processes" Third Edition. Routledge, 2023.

REFERENCES

1. Nonaka, I., & Takeuchi, H. "The Wise Company: How Companies Create Continuous Innovation", Oxford University Press, 2021.
2. Girard, J. P., & Girard, J. L., "Knowledge Management: Concepts, Methodologies, Tools, and Applications. IGI Global", 2022.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/e-learning/preview/noc23_mg96
2. <https://www.britannica.com/technology/search-engine>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	2	2	-	-	1	-	3	-	-	-	2	-	-
2	2	3	-	-	1	1	-	2	2	-	2	-	-
3	2	2	1	1	2	-	-	1	1	1	2	-	-
4	2	2	2	1	2	1	-	1	1	2	2	-	-
5	2	3	2	2	2	2	1	1	2	2	3	-	-
AVG.	2.0	2.4	1.7	1.3	1.6	1.3	2.0	1.3	1.5	1.7	2.2	-	-

1-Low 2-Medium 3-High '-'-No Correlation

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23MGT706

INDUSTRIAL MANAGEMENT

L T P C

3 0 0 3

OBJECTIVES

- To introduce the fundamentals of management and organizations.
- To enhance planning, organizing, and staffing functions.
- To impart knowledge of leadership, communication, controlling, and decision-making.
- To familiarize students with organizational behavior and change management.
- To provide knowledge of productivity improvement and modern management practices.

UNIT I INTRODUCTION TO MANAGEMENT

9

Management: Introduction; Definition and Functions - Approaches to the study of Management - Mintzberg's Ten Managerial Roles - Principles of Taylor, Weber, Parker - Forms of Organization: Sole Proprietorship; Partnership Cooperative - Public Sector Vs Private Sector Organization - Business Environment: Economic, Social, Political, Legal - Trade Union.

UNIT II FUNDAMENTALS OF MANAGERIAL FUNCTIONS

9

Planning - Strategic Planning - Vision & Mission statement in Planning - Organizing - Departmentalization - Centralization and Decentralization - Authority & Responsibility - Staffing: Systems Approach; Recruiting and Selection Process.

UNIT III MANAGERIAL FUNCTIONS IN ENGINEERING AND TECHNOLOGY

9

Directing - Leadership Traits; Style; Morale; Managerial Grids (Blake-Mouton, Reddin) - Communication - Barriers - Controlling- Audit - Preventive Control - Decision Making.

UNIT IV ORGANIZATION THEORY

9

Organizational Conflict: Positive Aspects; Individual; Role; Interpersonal; Intra Group; Inter Group; Conflict Management - Motivation Theories - Change Management -Sources of Resistance - Overcoming Resistance - Guidelines to managing Conflict.

UNIT V PRODUCTIVITY AND MODERN TOPICS

9

Productivity - Concept - Measurements - Affecting Factors; Methods to Improve - Business Process Reengineering (BPR) - Benchmarking - SWOT/SWOC Analysis - Total Productive Maintenance - Management of Information Systems (MIS), Industry

TOTAL: 45 PERIODS





OUTCOMES

Upon completion of this course, the students will be able to:

- Examine the fundamentals of management and organizations.
- Apply planning, organizing and staffing functions.
- Apply leadership, communication, controlling, and decision-making techniques.
- Analyse organizational behavior and change management practices.
- Compare productivity improvement techniques and modern management practices.

TEXT BOOKS

1. Koontz, H., Weihrich, H. and Cannice, M. V., "Essentials of Management: An International, Innovation and Leadership Perspective", Eleventh Edition, McGraw-Hill Education, 2021.
2. Govindarajan, M. and Natarajan, S., "Principles of Management, Prentice Hall of India / Pearson Education", New Delhi, 2009.

REFERENCES

1. Daft, Richard L., "Organization Theory and Design", Thirteenth Edition, Cengage Learning, 2020.
2. Certo, Samuel C. and Certo, S., "Trevis, Modern Management: Concepts and Skills", Fifteenth Edition, Pearson Education, 2020.

E-RESOURCES

1. https://www.jkkmcet.edu.in/software/uploads/syllabus/8d168a38585feb8e45346543f7aeaaff.pdf?utm_source=chatgpt.com
2. <https://sitams.ac.in/wp-content/uploads/2026/03/UNIT-II-MOB.pdf>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	1	-	-	-	-	1	1	-	-	2	1	-	-
2	1	2	-	-	1	-	-	1	1	3	-	-	-
3	1	2	-	-	-	1	1	2	2	2	-	-	-
4	1	2	-	-	-	2	2	2	2	1	1	-	-
5	1	2	1	-	2	1	-	1	1	3	2	-	-
AVG.	1.7	3.2	1.0	-	2.0	2.0	2.0	2.4	2.4	3.7	2.0	-	-

1-Low 2-Medium 3-High '-'-No Correlation

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23MGT707

SUPPLY CHAIN MANAGEMENT

LT P C

3 0 0 3

OBJECTIVES

- To introduce the major decisions in supply chain management.
- To familiarize students with the concepts of supplier selection and contract negotiation.
- To explore the impact of uncertainty on network design.
- To enhance knowledge of multiple-location inventory management concepts.
- To gain knowledge of supply chain integration concepts and their advancements in current trends.

UNIT I INTRODUCTION

9

Supply Chain- Fundamentals –Evolution –Role in Economy- Importance –Decision Phases
Supplier– Manufacturer-Customer chain.- Enablers/Drivers of Supply Chain Performance.
Supply chain strategy Supply Chain Performance Measures.

UNIT II STRATEGIC SOURCING

9

Outsourcing - Make Vs buy - Identifying core processes - Market Vs Hierarchy - Make Vs buy
continuum-Sourcing strategy Supplier Selection and Contract Negotiation.Creating a world class
supply base - Supplier Development - World Wide Sourcing.

UNIT III SUPPLY CHAIN NETWORK

9

Distribution Network Design - Role - Factors Influencing Options, Value Addition - Distribution
Strategies - Models for Facility Location and Capacity allocation. Distribution Center Location
Models. Supply Chain Network optimization models. Impact of uncertainty on Network Design-
Network Design decisions using Decision trees.

UNIT IV PLANNING DEMAND, INVENTORY AND SUPPLY

9

Managing supply chain cycle inventory. Uncertainty in the supply chain-Analyzing impact of
supply chain redesign on the inventory - Risk Pooling - Managing inventory for short life cycle
products - multiple item - multiple location inventory management. Pricing and Revenue
Management.

UNIT V CURRENTTRENDS

9

Supply Chain Integration - Building partnership and trust in SC Value of Information: Bullwhip
Effect-Effectiveforecasting-Coordinatingthesupplychain.SCRestructuring-SCMappingSC
process restructuring, Postpone the point of differentiation - IT in Supply Chain - Agile Supply
Chains Reverse Supply chain. Agra Supply Chains

TOTAL:45 PERIODS





OUTCOMES

Upon completion of this course, the student will be able to:

- Apply supply chain management principles in major supply chain decision areas.
- Examine supplier selection processes and contract negotiation strategies in supply chain operations.
- Analyze the impact of uncertainty on supply chain network design decisions.
- Apply appropriate approaches for managing multiple-location inventory systems.
- Explain the concepts of supply chain integration and their evolution in current industry trends.

TEXTBOOKS

1. Sunil Chopra, "Supply Chain Management: Strategy, Planning & Operation", PHI Learning, Eighth Edition, 2025.
2. David Simchi-Levi, Philip Kaminsky, Edith Simchi-Levi, and Ravi Shankar "Designing and Managing the Supply Chain: Concepts, Strategies, and Cases", Tata McGraw-Hill, Fourth Edition, 2022.

REFERENCES

1. Ballou Ronald H, "Business Logistics and Supply Chain Management", Fifth Edition, Pearson, 2021.
2. Shapiro Jeremy F, "Modeling the Supply Chain", Second Reprint, Pearson, 2022.

E-RESOURCES

1. [https://www.tutorialspoint.com/supply_chain_management\(SCMtutorial\)](https://www.tutorialspoint.com/supply_chain_management(SCMtutorial)).
2. [https://www.mixmove.io/post/supply-chain-integration\(supply-chain-integration\)](https://www.mixmove.io/post/supply-chain-integration(supply-chain-integration)).

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	2	2	2	1	1	1	1	-	-	-	2	-	-
2	2	2	1	1	-	2	1	1	2	2	2	-	-
3	2	3	2	2	2	1	1	-	-	-	2	-	-
4	2	2	3	2	2	1	1	-	-	-	3	-	-
5	1	1	1	-	1	2	1	-	1	2	2	-	-
AVG.	1.8	2	1.8	1.5	1.5	1.4	1	1	1.5	2	2.2	-	-

1-Low 2-Medium 3-High '-'-No Correlation

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23MGT708

e- WASTE MANAGEMENT

L T P C

3 0 0 3

OBJECTIVES

- To understand e-waste generation, composition, hazards, and impacts.
- To gain knowledge of global e-waste trade and recycling practices.
- To enhance understanding of e-waste control measures and regulatory frameworks.
- To impart knowledge of e-waste handling and management practices.
- To familiarize students with international e-waste legislations and policies.

UNIT I INTRODUCTION

9

E- waste composition and generation - Global context in e- waste - E-waste pollutants - E waste hazardous properties - Effects of pollutant (E- waste) on human health and surrounding environment - domestic e-waste disposal - Basic principles of E waste management - Technologies for recovery of resources from electronic waste - resource recovery potential of e-waste - steps in recycling and recovery of materials- technologies for recovery of materials - occupational and environmental health perspectives of recycling e-waste in India.

UNIT II E-WASTE HAZARDOUS ON GLOBAL TRADE

9

Essential factors in global waste trade economy - Free trade agreements as a means of waste trading - Import of hazardous e-waste in India - India's stand on liberalizing import rules - E-waste economy in the organized and unorganized sector - Estimation and recycling of e-waste in metro cities of India.

UNIT III E- WASTE CONTROL MEASURES

9

Need for stringent health safeguards and environmental protection laws in India - Extended Producers Responsibility (EPR) - Import of e-waste permissions - Producer-Public-Government cooperation - Administrative Controls & Engineering controls - monitoring of compliance of Rules - Effective regulatory mechanism strengthened by manpower and technical expertise - Reduction of waste at source.

UNIT IV E- WASTE MANAGEMENT HANDLING

9

E-waste (Management and Handling) Rules, 2022 - and E-Waste (Management) Rules – Salient Features and its likely implication - Government assistance for TSDFs.

UNITV THE INTERNATIONAL LEGISLATION

9

The Basel Convention - The Bamako Convention - The Rotterdam Convention - Waste Electrical and Electronic Equipment (WEEE) Directive in the European Union - Restrictions of Hazardous Substances (RoHS) Directive.

TOTAL:45 PERIODS





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OUTCOMES

Upon completion of this course, the students will be able to:

- Explain e-waste generation, composition, hazards, and environmental impacts.
- Analyze global e-waste trade and recycling practices.
- Apply e-waste control measures and regulatory frameworks.
- Describe e-waste handling, management, and recycling processes.
- Analyze international e-waste legislations and policies.

TEXTBOOKS

1. Priya, A. (Ed.), "Management of Electronic Waste: Resource Recovery, Technology and Regulation", First Edition, John Wiley & Sons, 2024.
2. Kumar, S., & Kumar, V., "Electronic Waste Management: Policies, Processes, Technologies, and Impact", John Wiley & Sons, 2024.

REFERENCES

1. Johri, R., "E-Waste: Implications, Regulations, and Management in India and Current Global Best Practices", First Edition, TERI Press, New Delhi, 2008.
2. Kumar, A., Rathore, P. S., Dubey, A. K., Srivastav, A. L., Dutt, V., & Ananth Kumar, T., "Sustainable Management of Electronic Waste", Second Edition, John Wiley & Sons, 2024.

E-RESOURCES

1. <https://news.mit.edu/2013/ewaste-mit>.
2. [https://www.who.int/news-room/fact-sheets/detail/electronic-waste-\(e-waste\)](https://www.who.int/news-room/fact-sheets/detail/electronic-waste-(e-waste))

Mapping of COs-POs&PSOs

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4	2	2	3	2	2	2	1	2	1	2	2	-	-
5	2	3	2	2	1	2	1	1	2	2	2	-	-
AVG.	1.8	2.4	2.4	1.8	1.4	2	1.2	1.3	1.8	2	1.8	-	-

1-Low 2-Medium 3-High '-'-No Correlation

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MANDATORY COURSE I

23MDC501 INTRODUCTION TO WOMEN AND GENDER STUDIES

L T P C

3 0 0 0

OBJECTIVES

- To introduce foundational concepts of sex, gender, masculinity, femininity, and socialization.
- To examine structural systems including patriarchy, essentialism, binaryism, power, and hierarchy.
- To study major theoretical frameworks of feminism
- To examine the history and evolution of global, national, and local women's movements.
- To analyze how gender is constructed and represented across language, popular visual media, and social media.

UNIT I CONCEPTS

Sex vs. Gender, masculinity, femininity, socialization, patriarchy, public/ private, essentialism, binaryism, power, hegemony, hierarchy, stereotype, gender roles, gender relation, deconstruction, resistance, sexual division of labour.

UNIT II FEMINIST THEORY

Liberal, Marxist, Socialist, Radical, Psychoanalytic, postmodernist, ecofeminist.

UNIT III WOMEN'S MOVEMENTS

Global, National and Local Rise of Feminism in Europe and America. Women's Movement in India.

UNIT IV GENDER AND LANGUAGE

Linguistic Forms and Gender. Gender and narratives.

UNIT V GENDER AND REPRESENTATION

Advertising and popular visual media. Gender and Representation in Alternative Media. Gender and social media.





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OUTCOMES

Upon completion of the course, the students will be able to:

- Identify and articulate concepts of socialization, binaryism, essentialism, and hegemony in social structures.
- Differentiate among various feminist theories and explain their core ideological foundations.
- Illustrate the milestones of women's rights movements in Europe, America, and India.
- Deconstruct linguistic forms and literary narratives to expose implicit gender biases.
- Assess media representations of gender roles in advertising and alternative media critically.

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23MDC502

ELEMENTS OF LITERATURE

L T P C

3 0 0 0

OBJECTIVES

- To explain students aware of the finer sensibilities of human existence through art.
- To develop students' appreciation of different literature forms as modes of human expression.
- To enhance reading, critical thinking, discussion, and writing skills through literary studies.
- To familiarize students with the essential elements, modes, and patterns of fiction and narrative perspective.
- To explore the representational, theatrical, and rhetorical elements of drama and poetry.

UNIT I RELEVANCE OF LITERATURE

Enhances Reading, thinking, discussing and writing skills. Develops finer sensibility for better human relationship. Increases understanding of the problem of humanity without bias. Providing space to reconcile and get a cathartic effect.

UNIT II ELEMENTS OF FICTION

Fiction, fact and literary truth, Fictional modes and patterns. Plot character and perspective.

UNIT III ELEMENTS OF POETRY

Emotions and imaginations. Figurative language. (Simile, metaphor, conceit, symbol, pun and irony). Personification and animation. Rhetoric and trend

UNIT IV ELEMENTS OF DRAMA

Drama as representational art, Content mode and elements, Theatrical performance, Drama as narration, mediation and persuasion, Features of tragedy, comedy and satire.

READINGS:

1. An Introduction to the Study of English Literature, W.H. Hudson, Atlantic, 2007.
2. An Introduction to Literary Studies, Mario Klarer, Routledge, 2013.
3. The Experience of Poetry, Graham Mode, Open college of Arts with Open Univ Press, 1991.
4. The Elements of Fiction: A Survey, Ulf Wolf (ed), Wolfstuff, 2114.
5. The Elements of Drama, J.L.Styan, Literary Licensing, 2011.





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OUTCOMES

Upon completion of the course, the students will be able to:

- Demonstrate enhanced reading, thinking, and writing skills by engaging with literary texts.
- Develop finer interpersonal sensibilities and an unbiased understanding of human issues.
- Experience catharsis and emotional reconciliation through literary analysis.
- Identify key figurative devices (metaphor, simile, irony, conceit) and emotional dimensions in poetry.
- Analyze dramatic performance, features of tragedy, comedy, satire, and narrative structures.


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23MDC503

FILM APPRECIATION

L T P C

3 0 0 0

OBJECTIVES

- To introduce the development of film as an art and entertainment form.
- To explore the century-long evolution of film language, movement, and form.
- To instruct students on how to read a film text and appreciate its structural nuances.
- To examine technical components including equipment, screenplays, roles, and the filmmaking process.
- To guide students in studying film theory, criticism, and visual storytelling joyfully.

Theme – A: The Component of Films

A-1: The material and equipment

A-2: The story, screenplay and script

A-3: The actors, crew members, and the director

A-4: The process of film making... structure of a film

Theme – B: Evolution of Film Language

B-1: Film language, form, movement etc.

B-2: Early cinema... silent film (Particularly French)

B-3: The emergence of feature films: Birth of a Nation

B-4: Talkies

Theme – C: Film Theories And Criticism/Appreciation

Theme – D: Development of Films

D-1: Representative Soviet films

D-2: Representative Japanese films

D-3: Representative Italian films

D-4: Representative Hollywood film and the studio system

Theme - E: Indian Films

E-1: The early era

E-2: The important films made by the directors

E-3: The regional films

E-4: The documentaries in India

READING: A Reader containing important articles on films will be prepared and given to the students. The students must read them and present in the class and have discussion on these.





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OUTCOMES

Upon completion of the course, the students will be able to:

- Explain the roles of materials, crew members, screenplays, and directors in film production.
- Trace the historical transition from silent cinema and early French films to talkies and feature films.
- Apply visual and auditory cinematic language to "read" films as complex texts.
- Evaluate film theories and engage in critical film appreciation.
- Demonstrate an understanding of storytelling structure and narrative techniques in modern cinema.


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23MDC504

DISASTER RISK REDUCTION AND MANAGEMENT

L T P C

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OBJECTIVES

- To impart knowledge on core concepts of hazards, vulnerability, resilience, and disaster risks.
- To familiarize students with international frameworks (Sendai Framework) and community-based risk reduction strategies.
- To explain the legislative, policy, and institutional frameworks governing disaster management in India.
- To introduce tools, technology, and early warning systems used in preparedness and damage assessment.
- To build practical response skills using case studies, field work, and mock drills.

UNIT I: HAZARDS, VULNERABILITY AND DISASTER RISKS

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Types of Disasters: Natural, Human induced, Climate change induced –Earthquake, Landslide, Flood, Drought, Fire etc – Technological disasters- Structural collapse, Industrial accidents, oil spills -Causes, Impacts including social, Economic, political, environmental, health, psychosocial, etc.- Disaster vulnerability profile of India

UNIT II DISASTER RISK REDUCTION (DRR)

Sendai Framework for Disaster Risk Reduction, Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community Based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions / Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders- Early Warning System – Advisories from Appropriate Agencies.- Relevance of indigenous Knowledge, appropriate technology and Local resources.

UNIT III DISASTER MANAGEMENT

Components of Disaster Management – Preparedness of rescue and relief, mitigation, rehabilitation and reconstruction- Disaster Risk Management and post disaster management – Compensation and Insurance- Disaster Management Act (2005) and Policy - Other related policies, plans, programmes and legislation - Institutional Processes and Framework at State and Central Level- (NDMA –SDMA-DDMA-NRDF- Civic Volunteers)

UNIT IV TOOLS AND TECHNOLOGY FOR DISASTER MANAGEMENT

Early warning systems -Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment. -





Elements of Climate Resilient Development –Standard operation Procedure for disaster response – Financial planning for disaster Management

UNIT V DISASTER MANAGEMENT: CASE STUDIES

Discussion on selected case studies to analyze the potential impacts and actions in the contest of disasters-Landslide Hazard Donation: Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.- Field work-Mock drill

OUTCOMES

Upon completion of the course, the students will be able to:

- Categorize natural, human-induced, and climate-related disasters and assess India's vulnerability profile.
- Formulate disaster risk reduction measures using structural, non-structural, and indigenous methods.
- Understand institutional roles (NDMA, SDMA, DDMA) and legal provisions under the Disaster Management Act (2005).
- Apply GIS, information technology, and standard operating procedures for risk assessment and relief planning.
- Perform damage assessments and participate in mock drills, practical response plans, and field interventions.


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23MDC505

CONSTITUTION OF INDIA

L T P C

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OBJECTIVES

- To understand the meaning of the Constitution law and Constitutionalism.
- To realize the fundamental rights.
- To understand the execution powers of union and states.
- To be aware of the Constitutional powers.
- To acquaint with other Constitutional functionaries.

UNIT I INTRODUCTION

Meaning of the Constitution law and constitutionalism - Historical perspective of the Constitution of India - Preamble - Salient features and characteristics of the Constitution of India - Citizenship.

UNIT II FUNDAMENTAL RIGHTS

Scheme of the fundamental rights - The scheme of the fundamental duties and its legal status - The directive principles of state policy - Its importance and implementation.

UNIT III UNION AND STATE EXECUTIVE

Federal structure and distribution of legislative and financial powers between the Union and the States - Parliamentary form of Government in India - The Constitution powers and status of the President of India - Governor - Appointment, powers and functions.

UNIT IV CONSTITUTIONAL POWERS

Amendment of the Constitutional powers and procedure - The historical perspectives of the Constitutional amendments in India - Emergency provisions: National emergency, President rule, financial emergency.

UNIT V OTHER CONSTITUTIONAL FUNCTIONARIES

Election Commission of India: Organization, powers and functions, Union Public Service Commission, State Public Service Commission - Local Self Government.





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OUTCOMES

Upon completion of the course, the students will be able to:

- Understand the salient features and characteristics of the Constitution of India.
- Analyze the scheme of the fundamental rights and duties.
- Evaluate in detail the powers between the Union and the States.
- Know the concept of Constitutional powers.
- Recognize other Constitutional functionaries.


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MANDATORY COURSES II

23MDC601

WELL-BEING WITH TRADITIONAL PRACTICES-
YOGA, AYURVEDA AND SIDDH

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OBJECTIVES

- To enjoy life happily with fun filled new style activities that help to maintain health.
- To adapt a few lifestyle changes that will prevent many health disorders.
- To be cool and handbill every emotion very smoothly in every walk of life.
- To learn to eat cost effective but healthy foods that are rich in essential nutrients.
- To develop immunity naturally that will improve resistance against many health disorders.

UNIT I HEALTH AND ITS IMPORTANCE

Definition - Importance of maintaining health - More importance on prevention than treatment
Ten types of health one has to maintain - Physical health - Mental health - Social health -
Financial health - Emotional health - Spiritual health - Intellectual health - Relationship health -
Environmental health - Occupational/Professional health

UNIT II DIET

Role of diet in maintaining health - energy one needs to keep active throughout the day -
nutrients one needs for growth and repair - helps one to stay strong and healthy - helps to
prevent diet-related illness, such as some cancers - keeps active and - helps one to maintain a
healthy weight - helps to reduce risk of developing lifestyle disorders like diabetes - arthritis -
hypertension - PCOD - infertility - ADHD - sleeplessness -helps to reduce the risk of heart
diseases - keeps the teeth and bones strong Balanced Diet and its 7 Components -
Carbohydrates - Proteins - Fats - Vitamins - Minerals - Fibre and Water.

Food additives and their merits & demerits - Effects of food additives - Types of food
additives - Food additives and processed foods - Food additives and their reactions

Definition of BMI and maintaining it with diet Importance - Consequences of not maintaining BMI
- different steps to maintain optimal BM

Common cooking mistakes Different cooking methods, merits and demerits of each method

UNIT III ROLE OF AYURVEDA & SIDDHA SYSTEMS IN MAINTAINING HEALTH

AYUSH systems and their role in maintaining health - preventive aspect of AYUSH - AYUSH as
a soft therapy. Secrets of traditional healthy living - Traditional Diet and Nutrition - Regimen of
Personal and Social Hygiene - Daily routine (Dinacharya) - Seasonal regimens (Ritucharya) -
basic sanitation and healthy living environment - Sadvritta (good conduct) - for conducive social
life.

Principles of Siddha & Ayurveda systems - Macrocosm and Microcosm theory - Panchekarana
Theory / (Five Element Theory) 96 fundamental Principles - Uyir Thathukkal (Tri-Dosha Theory)
- Udal Thathukkal





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Prevention of illness with our traditional system of medicine
Primary Prevention - To decrease the number of new cases of a disorder or illness - Health promotion/education, and - Specific protective measures - **Secondary Prevention** - To lower the rate of established cases of a disorder or illness in the population (prevalence) - **Tertiary Prevention** - To decrease the amount of disability associated with an existing disorder.

UNIT IV MENTAL WELLNESS

Emotional health - Definition and types - Three key elements: the subjective experience - the physiological response - the behavioral response - Importance of maintaining emotional health - Role of emotions in daily life - Short term and long term effects of emotional disturbances - Leading a healthy life with emotions - Practices for emotional health - Recognize how thoughts influence emotions - Cultivate positive thoughts - Practice self-compassion

Stress management - Stress definition - Stress in daily life - How stress affects one's life - Identifying the cause of stress - Symptoms of stress - Managing stress (habits, tools, training, professional help) - Complications of stress mismanagement. Sleep - Sleep and its importance for mental wellness - Sleep and digestion. Immunity - Types and importance - Ways to develop immunity.

UNIT V YOGA

Definition and importance of yoga - Types of yoga - How to Choose the Right Kind for individuals according to their age - The Eight Limbs of Yoga - Simple yogasanas for cure and prevention of health disorders - What yoga can bring to our life.

OUTCOMES

Upon completion of the course, the students will be able to:

- Identify and explain the ten types of health, including physical, mental, emotional, spiritual, and environmental health.
- Analyze the role of a balanced diet and its 7 components in preventing lifestyle disorders like diabetes, hypertension, and arthritis.
- Understand the principles of Siddha and Ayurveda systems, including the Five Element Theory, Tri-Dosha Theory, and daily/seasonal regimens (Dinacharya/Ritucharya).
- Apply stress management techniques, sleep hygiene practices, and emotion-regulation strategies to enhance mental wellness.
- Demonstrate basic yogasanas and understand the Eight Limbs of Yoga for health disorder prevention and cure.


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23MDC602 HISTORY OF SCIENCE AND TECHNOLOGY IN INDIA

L T P C

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OBJECTIVES

- To enjoy life happily with fun filled new style activities that help to maintain health also.
- To adapt a few lifestyle changes that will prevent many health disorders.
- To be cool and handle every emotion very smoothly in every walk of life.
- To learn to eat cost effective but healthy foods that are rich in essential nutrients.
- To develop immunity naturally that will improve resistance against many health disorders.

UNIT I CONCEPTS AND PERSPECTIVES

Meaning of History Objectivity, Determinism, Relativism, Causation, Generalization in History; Moral judgment in history Extent of subjectivity, contrast with physical sciences, interpretation and speculation, causation verses evidence, concept of historical inevitability, Historical Positivism. Science and Technology-Meaning, Scope and Importance, Interaction of science, technology & society, Sources of history on science and technology in India.

UNIT II HISTORIOGRAPHY OF SCIENCE AND TECHNOLOGY IN INDIA

Introduction to the works of D.D. Kosambi, Dharmapal, Debiprasad Chattopadhyay, Rehman, S. Irfan Habib, Deepak Kumar, Dhruv Raina, and others.

UNIT III SCIENCE AND TECHNOLOGY IN ANCIENT INDIA

Technology in pre-historic period Beginning of agriculture and its impact on technology Science and Technology during Vedic and Later Vedic times Science and technology from 1st century AD to C-1200.

UNIT IV SCIENCE AND TECHNOLOGY IN MEDIEVAL INDIA

Legacy of technology in Medieval India, Interactions with Arabs Development in medical knowledge, interaction between Unani and Ayurveda and alchemy Astronomy and Mathematics: interaction with Arabic Sciences Science and Technology on the eve of British conquest

UNIT V SCIENCE AND TECHNOLOGY IN COLONIAL INDIA

Science and the Empire Indian response to Western Science Growth of techno-scientific institutions

Science and Technology In A Post-Independent India

Science, Technology and Development discourse Shaping of the Science and Technology Policy Developments in the field of Science and Technology Science and technology in globalizing India Social implications of new technologies like the Information Technology and Biotechnology.





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OUTCOMES

Upon completion of the course, the students will be able to:

- Explain the concepts, perspectives, and significance of history, science, and technology in India.
- Examine the contributions of major historians to the historiography of science and technology in India.
- Analyze the development of science and technology in Ancient and Medieval India and their societal contributions.
- Analyze the influence of colonial rule on scientific progress and institutional development in India.
- Evaluate the advancements in science and technology in post-independent India and their impact on development and globalization.


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23MDC603 POLITICAL AND ECONOMIC THOUGHT FOR A HUMANE SOCIETY L T P C
3 0 0 0

OBJECTIVES

- Define key historical concepts like determinism, relativism, causation, and historical positivism as applied to science and technology.
- Recognize the historiographical contributions of scholars such as D.D. Kosambi, Dharampal, and Debiprasad Chattopadhyay.
- Explain the technological advancements made during ancient and medieval Indian history, including interactions with Arabic sciences.
- Evaluate the growth of techno-scientific institutions and the Indian response to Western science during the colonial period.
- Assess the social implications of emerging technologies and science policy decisions in post-independent and globalizing India.

COURSE TOPICS:

Considerations for humane society, holistic thought, human being's desires, harmony in self, harmony in relationships, society, and nature, societal systems. **(9 lectures, 1 hour each)**

(Refs: A Nagaraj, M K Gandhi, JC Kumarappa)

Capitalism – Free markets, demand-supply, perfect competition, laissez-faire, monopolies, imperialism. Liberal democracy. **(5 lectures)**

(Refs: Adam Smith, J S Mill)

Fascism and totalitarianism. World war I and II. Cold war. **(2 lectures)**

Communism – Mode of production, theory of labour, surplus value, class struggle, dialectical materialism, historical materialism, Russian and Chinese models.

(Refs: Marx, Lenin, Mao, M N Roy) **(5 lectures)**

Welfare state. Relation with human desires. Empowered human beings, satisfaction. (3 lectures)

Gandhian thought. Swaraj, Decentralized economy & polity, Community. Control over one's lives. Relationship with nature. (6 lectures)

(Refs: M K Gandhi, Schumacher, Kumarappa)

Essential elements of Indian civilization. **(3 lectures)**

(Refs: Pt Sundarlal, R C Mazumdar, Dharampal)

Technology as driver of society, Role of education in shaping of society.

Future directions. **(4 lectures)**

(Refs: Nandkishore Acharya, David Dixon, Levis Mumford)

Conclusion **(2 lectures)**





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OUTCOMES

Upon completion of the course, the students will be able to:

- Understand the core considerations required for a humane society and achieving harmony across self, society, and nature.
- Compare the theoretical foundations and historical implementations of free-market capitalism, imperialism, and communism.
- Analyze the relation between human desires, empowerment, satisfaction, and the mechanisms of a welfare state.
- Apply Gandhian economic and political thought (Swaraj, decentralized polity) to contemporary societal and environmental challenges.
- Evaluate future directions for society by considering technology as a driver and education .


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23MDC604

STATE, NATION BUILDING AND POLITICS IN INDIA

L T P C

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OBJECTIVES

- To provide an understanding of the state, its main organs (Executive, Legislature, Judiciary), separation of powers, and the concept of sovereignty.
- To acquaint students with the legacies of the national movement and constitutional development in India.
- To explain the reasons for adopting a Parliamentary-federal system and the broad philosophy of the Constitution of India.
- To examine the changing nature of the Indian political system, new social movements, and challenges to nation-building.
- To discuss issues concerning national integration and nation-building with the aim of developing a future vision for better governance.

TOPICS:

Understanding the need and role of State and politics. Development of Nation-State, sovereignty, sovereignty in a globalized world. 183 Organs of State – Executive, Legislature, Judiciary. Separation of powers forms of government unitary-federal, Presidential-Parliamentary, and The idea of India.

1857 and the national awakening.

1885 Indian National Congress and development of national movement – its legacies.

Constitution making and the Constitution of India.

Goals, objective and philosophy. Why a federal system? National integration and nation-building

Challenges of nation-building – State against democracy (Kothari) New social movements. The changing nature of Indian Political System, the future scenario. What can we do?

OUTCOMES

Upon completion of the course, the students will be able to:

- Understand the theoretical aspects of the state, its organs, operationalization, and sovereignty in a globalized world.
- Explain the historical background, philosophy, goals, and objectives behind the founding of the Indian Constitution.
- Analyze the rationale behind adopting a federal-parliamentary system and the broad streams of national integration.
- Identify major challenges to nation-building, social movements, and institutional difficulties within the democratic setup.
- Devise perspectives for active participation in the system to improve governance and delivery for the common citizen.

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23MDC605

INDUSTRIAL SAFETY

L T P C

3 0 0 0

OBJECTIVES

- To understand the introduction and basic terminologies of safety.
- To enable the students to learn about the important statutory regulations and standards.
- To enable students to conduct and participate in various safety activities in the industry.
- To have knowledge about workplace exposures and hazards.
- To assess various hazards and consequences through various risk assessment techniques

UNIT I SAFETY TERMINOLOGIES

Hazard-Types of Hazard- Risk-Hierarchy of Hazards Control Measures-Lead indicators- lag Indicators-Flammability- Toxicity Time-weighted Average (TWA) - Threshold Limit Value (TLV) - Short Term Exposure Limit (STEL)- Immediately dangerous to life or health (IDLH)- acute and chronic Effects- Routes of Chemical Entry-Personnel Protective Equipment- Health and Safety Policy-Material Safety Data Sheet MSDS

UNIT II STANDARDS AND REGULATIONS

Indian Factories Act-1948- Health- Safety- Hazardous materials and Welfare- ISO 45001:2018 occupational health and safety (OH&S) - Occupational Safety and Health Audit IS14489:1998- Hazard Identification and Risk Analysis- code of practice IS 15656:2006

UNIT III SAFETY ACTIVITIES

Toolbox Talk- Role of safety Committee- Responsibilities of Safety Officers and Safety Representatives- Safety Training and Safety Incentives- Mock Drills- On-site Emergency Action Plan- Off-site Emergency Action Plan- Safety poster and Display- Human Error Assessment

UNIT IV WORKPLACE HEALTH AND SAFETY

Noise hazard- Particulate matter- musculoskeletal disorder improper sitting posture and lifting Ergonomics RULE & REBA- Unsafe act & Unsafe Condition- Electrical Hazards- Crane Safety- Toxic gas Release

UNIT V HAZARD IDENTIFICATION TECHNIQUES

Job Safety Analysis-Preliminary Hazard Analysis-Failure mode and Effects Analysis- Hazard and Operability- Fault Tree Analysis- Event Tree Analysis Qualitative and Quantitative Risk Assessment- 217 Checklist Analysis- Root cause analysis- What-If Analysis- and Hazard Identification and Risk Assessment





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OUTCOMES

Upon completion of the course, the students will be able to:

- Understand the basic concept of safety.
- Obtain knowledge of Statutory Regulations and standards
- Know about the safety Activities of the Working Place.
- Analyze on the impact of Occupational Exposures and their Remedies
- Obtain knowledge of Risk Assessment Techniques.

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DEPARTMENT OF CIVIL ENGINEERING

REGULATIONS – 2023

(Revision II)

MINOR/HONOURS DEGREE CONSTRUCTION TECHNOLOGY

CURRICULUM AND SYLLABI





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CURRICULUM AND SYLLABI

FOR B.E./B.Tech. DEGREE PROGRAMMES

(MINOR DEGREE/HONOURS- CONSTRUCTION TECHNOLOGY)

B.E. - CIVIL ENGINEERING

Course Code	Name of the Subject	Category	Periods /Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23CECT01	Advanced Construction Materials	PC	3	0	0	3	40	60	100
23CECT02	Safety in Construction	PC	3	0	0	3	40	60	100
23CECT03	Sustainable Construction Engineering	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23CECE01	Advanced Techniques in Concrete Construction	PC	3	0	2	4	40	60	100
EMPLOYABILITY ENHANCEMENT COURSE									
23CECP01	Project Work	EEC	0	0	12	6	60	40	100
TOTAL CREDITS						19			

PC	: Professional Core
EEC	: Employability Enhancement Courses
L	: Lecture
T	: Tutorial
P	: Practical
C	: Credit Point
CIA	: Continuous Internal Assessment
ESE	: End Semester Examination
TOT	: Total





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23CECT01

ADVANCED CONSTRUCTION MATERIALS

L T P C
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OBJECTIVES

- To inculcate the different construction materials.
- To enhance the role of ceramic materials in construction.
- To instruct the use of polymer materials.
- To gain knowledge on the techniques involved in waterproofing course.
- To familiarize with the fundamentals of admixtures of concrete.

UNIT I CONSTRUCTION MATERIALS

9

Classification of construction materials - Selection criteria for construction materials - Green building materials - waste products - Reuse and recycling.

UNIT II CERAMIC MATERIALS

9

Classification - glass wool - Thermal and electrical properties - Fire resistant materials - Uses and applications.

UNIT III POLYMERIC MATERIALS

9

Rubber and plastics - Polymers in civil engineering polymers - types of fibers - Fiber reinforced plastic in sandwich panels.

UNIT IV WATER PROOFING MATERIALS

9

Waterproofing materials and compounds - flooring materials - required materials.

UNIT V ADMIXTURES

9

Use of waste product and industrial by product:-Fly ash – silica - GGBS and other mineral products – Geo-textile and Geo-synthetics applications in civil engineering.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Identify the suitable construction materials.
- Apply the knowledge in ceramic materials.
- Construct the polymer materials for various construction applications.
- Analyze the water proofing material importance.
- Classify the admixture in fresh and hardened concrete.

TEXT BOOKS

1. Shetty M.S., "Concrete Technology", S.Chand and Company Ltd., Eighth Edition, 2019.
2. Krishnaraju N., "Advanced Concrete Technology", CBS Publishers, Tenth Edition, 2020.





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REFERENCES

1. Gambir, M.L. "Concrete Technology", Tata McGraw Hill, Publishing Co,Ltd, Sixth Edition, 2019.
2. Santhakumar, A.R., "Concrete Technology", Oxford University Press, Tenth Edition, 2020.

E-RESOURCES

1. <https://nptel.ac.in/courses/105/102/105102012/> (Concrete Technology)
2. <https://nptel.ac.in/courses/105/106/105106176/> (Advanced Concrete Technology)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	1	2	-	1	2	-	2	2	2	2	2
2	3	2	1	2	-	1	2	-	2	2	2	2	2
3	3	2	1	2	-	1	2	-	2	2	2	2	2
4	3	2	1	2	-	1	2	-	2	2	3	2	2
5	3	2	2	2	-	1	2	-	2	2	3	2	2
AVG	3	2	1.2	2	-	1	2	-	2	2	2.4	2	2

1-Low 2-Medium 3-High '-' – No Correlation


Chairman - BoS





23CECT02

SAFETY IN CONSTRUCTION

L T P C
3 0 0 3

OBJECTIVES

- To impart knowledge on the importance of safety in the construction.
- To inculcate the causes and remedies of construction accidents.
- To familiarize with the site safety precautionary measures to avoid accidents.
- To acquire the safety during construction, alteration, demolition works.
- To enhance the safe operating procedures in the construction.

UNIT I INTRODUCTION

9

Basic terminology in safety, safety standards and signs, signals in construction, role of stakeholders in construction safety.

UNIT II ACCIDENTS IN CONSTRUCTION

9

Accident patterns, theories of accident-causation, cost of injury vs investment in safety, types of injuries, safety program accident / incident investigation, safety pyramid, PPE in construction, a case study on construction safety.

UNIT III SAFETY PRECAUTIONS

9

Introduction to OSHA regulations; Role of stakeholders in safety Site safety programs - Job hazard analysis, HIRA(Hazard identification and risk assessment),accident investigation & accident indices-violation, Penalty.

UNIT IV SAFETY MEASURES IN CONSTRUCTION

9

Safety during construction, alteration, demolition works - Earthwork, steel construction, temporary structures, masonry & concrete construction, cutting & welding.

UNIT V SAFETY OPERATIONS

9

SoPs (Safe Operating Procedures) - Construction equipment, materials handling-disposal & hand tools, other hazards - fire, confined spaces, electrical safety; BIM & safety.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Apply the role of safety standards and signs in construction.
- Inspect the accidents in construction by investigating the accident patterns.
- Construct the role of stakeholders in safety site safety programs.
- Analyze safety measures in construction, alteration, demolition works
- Examine the safety operating procedures.





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TEXT BOOKS

1. Haupt T.C, J. Hinze, " The Management of Construction Safety and Health", Taylor & Francis, Eighth Edition, 2020.
2. Charles D. Reese, James Vernon Eidson, "Handbook of OSHA construction safety and health", Taylor & Francis, Second Edition, 2019.

REFERENCES

1. IS 9457:1980, "Code of practice for safety colors and safety signs" BIS.
2. IS 13415:1992, "Protective barriers in and around building – code of safety" BIS.

E-RESOURCES

1. <https://nptel.ac.in/courses/105102206/> (Safety in Construction)
2. <https://nptel.ac.in/courses/110105094/> (Industrial Safety Engineering)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	3	2	2	1	1	-	-	-	-	3	3
2	3	3	2	2	1	1	1	-	-	-	-	3	2
3	3	3	3	2	2	1	1	-	-	-	-	3	3
4	3	3	2	2	1	1	1	-	-	-	-	3	2
5	3	3	3	2	1	1	1	-	-	-	-	3	3
AVG	3	3	2.6	2	1.4	1	1	-	-	-	-	3	2.6

1-Low 2-Medium 3-High '-' – No Correlation


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23CECT03

SUSTAINABLE CONSTRUCTION ENGINEERING

L T P C
3 0 0 3

OBJECTIVES

- To instruct the comprehensive overview of materials used for sustainable buildings
- To familiarize with the engineering practices in sustainable construction.
- To inculcate the role of assessment in sustainable construction.
- To acquire the innovative sustainable materials.
- To gain knowledge on the fundamentals of life cycle assessment.

UNIT I INTRODUCTION

9

Introduction to Sustainable Building Materials – Qualities - Uses - Examples - Natural building materials.

UNIT II SUSTAINABLE CONSTRUCTION ENGINEERING

9

Fundamentals of Sustainable Construction Engineering- Sustainability and resources, need, present practices at national and international level, The Sustainability Quadrant- challenges & Issues, Government initiatives.

UNIT III SUSTAINABILITY ASSESSMENT

9

Sustainability assessment using standard approaches- LEED/GRIHA rating evaluation process. Socio - economic feasibility of sustainable construction products.

UNIT IV SUSTAINABLE PRODUCT DESIGN

9

Innovative & customized sustainable product design based on social constraints, tools & aids available for sustainable construction products.

UNIT V SUSTAINABLE LIFE CYCLE

9

Life Cycle Assessment and Costing-Variations aspects related to construction cost, present value analysis, life cycle stages.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Identify the concept of sustainable materials in construction.
- Apply the knowledge in sustainable construction engineering.
- Analyze the role of LEED/GRIHA in construction.
- Design the innovative product in sustainable construction.
- Develop the importance of sustainable life cycle assessment.

TEXT BOOKS

1. Yates J K, "Sustainability in Engineering Design and Construction", CRC Press, Third Edition, 2019.
2. Edmundas Kazimieras Zavadskas, "Sustainability in Construction Engineering", MDPI AG, Sixth Edition, 2020.





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REFERENCES

1. Abhinandan R. Gupta, S.K. Deshmukh, "Sustainable Construction Engineering & Management", Abhinandan Gupta Publications, Tenth Edition 2020.
2. Liv Haselbach, "Sustainable Construction for Engineers", McGraw-Hill Education, Seventh Edition, 2019.

E-RESOURCES

1. <https://nptel.ac.in/courses/105102195/> (Sustainable Materials and Green Buildings)
2. <https://nptel.ac.in/courses/124107011/> (Sustainable Architecture)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	2	2	2	1	1	2	-	-	-	1	3	2
2	3	2	2	2	1	1	1	-	-	-	1	3	2
3	3	2	2	1	1	1	2	-	-	-	1	3	3
4	3	2	2	2	1	2	1	-	-	-	1	3	2
5	3	1	2	2	1	2	2	-	-	-	1	2	2
AVG	3	1.8	2	1.8	1	1.4	1.6	-	-	-	1	2.8	2.2

1-Low 2-Medium 3-High '-' – No Correlation


Chairman - BoS





23CECE01

ADVANCED TECHNIQUES IN CONCRETE CONSTRUCTION (Lab Embedded Theory Course)

L T P C
3 0 2 4

OBJECTIVES

- To gain systematic knowledge of concrete constituents.
- To instruct the concrete mix design principles.
- To impart knowledge on the basic concepts of special concrete.
- To enhance the techniques involved in properties of concrete.
- To inculcate the fundamentals of concreting testing and their qualities.
- To acquire practical skills the advanced NDT techniques for determining the quality of concrete.

UNIT I FUNDAMENTALS OF CONCRETE

9

Features of Recent Advances in Concrete, Types of Concrete to be dealt; Terminologies, Ingredients, Properties of Fresh & Hardened concrete, related tests, Production and use of concrete.

UNIT II MIX DESIGN PRINCIPLES

9

Concrete mix design, Basic considerations and choice a mix proportions, various methods of mix designs including IS Code method. Quality control and quality assurance of concrete, Acceptance criteria. High workability concrete/Self compacting concrete, Fiber reinforced concrete, Polymer-concrete composites.

UNIT III ADVANCES IN CONCRETE

9

Special Concretes: Definition & Introduction, General properties, Advantages, Disadvantages, Applications, Concreting practices, Guidelines for Mix design and use of following concretes: High density concrete, Shrinkage compensating concrete, Mass concrete, Roller compacted concrete.

UNIT IV PROPERTIES OF CONCRETE

9

Durability of Concrete: Definitions, Deterioration processes– Physical, Chemical, Environmental & Biological; Measures for ensuring durability, Corrosion of reinforcing steel, protective measures.

UNIT V TESTING AND QUALITY OF CONCRETE

9

Testing and Quality Control of Concrete: Classification of test methods, In-situ, Non-Destructive & Partially-Destructive tests for fresh concrete, hardened concrete and durability of concrete. Problems on the in-situ testing results and compared with Laboratory results.

LIST OF PRACTICALS

1. Study of IS code related to mix design.
2. Determine Compressive strength of High grade concrete by using different admixtures.
3. Study and performance on Rebound Hammer.
4. Study and performance on Ultrasonic Pulse Velocity.
5. Study and performance on Profometer.
6. Study and performance on Crack scope.
7. Study of Self Compacting Concrete.

TOTAL: 45+15 = 60 PERIODS





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OUTCOMES

Upon completion of the course, Students will be able to:

- Analyze the properties of the constituent materials of concrete.
- Design concrete mixes and apply statistical quality control techniques
- Examine the special concrete technologies.
- Analyze the durability of concrete
- Identify the importance on properties of fresh and hardened concrete.
- Construct the compressive strength of concrete with admixtures.

TEXT BOOKS

1. Shetty M.S., "Concrete Technology", , S.Chand and Company Ltd., Eighth Edition 2019.
2. Krishnaraju N., "Advanced Concrete Technology", CBS Publishers, Fourth Edition, 2020.

REFERENCES

1. Gambir M.L., "Concrete Technology", Tata McGraw Hill, Publishing Co,Ltd, Sixth Edition, 2017.
2. Santhakumar A.R., "Concrete Technology", Oxford University Press, Tenth Edition, 2018.

E-RESOURCES

1. <https://nptel.ac.in/courses/105/102/105102012/> (Concrete Technology)
2. <https://nptel.ac.in/courses/105/106/105106176/> (Advanced Concrete Technology)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1	3	3	2	3	1	-	-	-	-	1	1	3	1
2	3	3	2	2	1	-	-	-	-	1	1	3	2
3	3	3	2	3	1	-	-	-	-	1	1	3	2
4	3	3	2	2	1	-	-	-	-	1	1	3	1
5	3	3	1	3	1	-	-	-	-	1	1	3	1
6	3	2	1	1	1	-	-	-	-	1	1	2	1
AVG	3	2.8	1.6	2.3	1	-	-	-	-	1	1	2.8	1.3

1-Low 2-Medium 3-High '-' – No Correlation

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23CECP01

PROJECT WORK

L T P C
0 0 12 6

OBJECTIVES

- To develop knowledge to formulate a real world problem and projects goals.
- To identify the various tasks of the project to determine standard procedures.
- To identify and learn new tools, algorithms and techniques.
- To understand the various procedures for validation of the product and analysis the cost effectiveness.
- To understand the guideline to Prepare report for oral demonstrations.

PROCESS DESCRIPTION

- For Project work out of 100 marks, the maximum marks for Continuous Internal Assessment is fixed as 60 and the End Semester Examination (project report evaluation and viva voce examination) carries 40 marks. Project work shall be assigned to a single student.
- The project work shall be undertaken by students either in industry or in the college.
- The total credit for project work in semester is 6.
- There shall be three reviews (Zeroth Review, (Review I and Review II, each 100 marks)) during the semester by a review committee. The student shall make presentation on the progress made before the committee. The Head of the Department shall constitute a review committee for each programme. There shall be a minimum of three members in the review committee.
- The committee shall consist of the Supervisor, Project Coordinator and one of the faculty members.
- The student(s) is expected to submit the project report on or before the last working day of the semester. The ESE for the project work shall consist of the evaluation of the final project report submitted by the student or students of the project group by an external examiner, followed by a viva-voce examination conducted separately for each student by a committee consisting of the external examiner and an internal examiner (other than supervisor). The project coordinator shall be the internal examiner. The COE shall appoint the External Examiner for the ESE of the Project Work. The project report shall be submitted as per the approved guidelines given by Controller of Examinations.

OUTCOMES

Upon completion of the course, the students will be able to:

- Formulate real-world problems.
- Design and express technical solutions using appropriate tools and techniques.
- Test and validate prototypes for efficiency and cost-effectiveness, and present their work effectively through reports and oral demonstrations.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
Mapping outcome	3	3	3	3	3	3	3	3	3	3	3	3	3

1-Low, 2-Medium, 3-High, “-” - No Correlation

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CURRICULUM AND SYLLABI FOR B.E./B.Tech. DEGREE PROGRAMMES (MINOR/HONOURS DEGREE- CONSTRUCTION TECHNOLOGY)

CREDIT SUMMARY

B.E. - CIVIL ENGINEERING

Category	Credits Per Semester								Credit Total
	I	II	III	IV	V	VI	VII	VIII	
PC	-	-	3	3	3	4	-	-	13
EEC	-	-	-	-	-	-	6	-	6
Total	-	-	3	3	3	4	6	-	19





MINOR DEGREE
CURRICULUM & SYLLABUS
INDIAN KNOWLEDGE SYSTEM (IKS)

Important Guidelines

- The following Subjects (IKS-I to IKS-XX) with each 3 credits are Suggested syllabus for the Open Electives and Minor Degree in the Indian Knowledge System (IKS).
- IKS I & IKS II are mandatory for the minor degree which are 3 credits each.
- Students can opt any 2 subjects with 3 credits each from the IKS –III to IKS – XI subjects and other two subjects with 3 credits each from the IKS – XII to IKS –XX given below.
- Students who have 7.5 CGPA are eligible for this IKS Minor degree and it shall be offered from III semester onwards.
- Students need a minimum of 18 credits to be awarded the minor degree.



CURRICULUM AND SYLLABI FOR B.E./B.Tech. DEGREE PROGRAMMES MINOR DEGREE - INDIAN KNOWLEDGE SYSTEM (IKS)

Course Code	Name of the Subject	Category	Periods /Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23IKS01	Introduction to Indian Culture and Civilization	PC	3	0	0	3	40	60	100
23IKS02	Indian Culture and Civilization with its Knowledge Systems and Traditions	PC	3	0	0	3	40	60	100
23IKS03	Vision for a Human Society	PC	3	0	0	3	40	60	100
23IKS04	Indian Science, Engineering, and Technology - Past, Present & Future	PC	3	0	0	3	40	60	100
23IKS05	Indian Town Planning and Architecture	PC	3	0	0	3	40	60	100
23IKS06	Indian Mathematics and Astronomy	PC	3	0	0	3	40	60	100
23IKS07	Indian Aesthetics (including Music & Musical Instruments)/Arthashastra	PC	3	0	0	3	40	60	100
23IKS08	Indian Health, Wellness, and Psychology - including Ayurveda	PC	3	0	0	3	40	60	100
23IKS09	Indian System of Proof and Logic (including Nyay Shastra)	PC	3	0	0	3	40	60	100
23IKS10	Indian Linguistics and Phonetics	PC	3	0	0	3	40	60	100
23IKS11	Indian Governance, Administration, and Management Systems (including Arthashastra)	PC	3	0	0	3	40	60	100
23IKS12	Indian Physics (e.g., Vaisheshik)	PC	3	0	0	3	40	60	100
23IKS13	Textile Industry in India	PC	3	0	0	3	40	60	100
23IKS14	Shipbuilding and Maritime Trade	PC	3	0	0	3	40	60	100
23IKS15	Transport Systems in India	PC	3	0	0	3	40	60	100



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23IKS16	Principles and Practice of Mechanics and Machines	PC	3	0	0	3	40	60	100
23IKS17	Water Management in India	PC	3	0	0	3	40	60	100
23IKS18	Ecology and Geography in India	PC	3	0	0	3	40	60	100
23IKS19	Natural Agriculture and Horticulture Practices in India	PC	3	0	0	3	40	60	100
23IKS20	Indian Economics (Arthashastra)	PC	3	0	0	3	40	60	100
TOTAL CREDITS							60		

PC : Professional Core
EEC : Employability Enhancement Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total





23IKS01

INTRODUCTION TO INDIAN CULTURE AND CIVILIZATION

L T P C
3 0 0 3

OBJECTIVES

- To inculcate the historical, cultural, and social development of Indian civilization.

UNIT I OVERVIEW OF INDIAN CIVILIZATION:

- Ancient India: Indus Valley Civilization, Vedic Period
- Major Dynasties: Mauryan, Gupta, Mughal

UNIT II CULTURAL CONTRIBUTIONS:

- Art and Architecture: Temples, Monuments, and Modern Innovations
- Literature and Music: Classical and Contemporary

UNIT III SOCIAL STRUCTURES AND PRACTICES:

- Traditional Social Systems: Caste, Family, and Community
- Modern Practices and Changes

UNIT IV CONTEMPORARY INDIAN CULTURE:

- Festivals and Rituals
- Impact of Globalization on Indian Traditions

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the impact of globalization on Indian traditions and cultural practices.


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23IKS02

INDIAN CULTURE AND CIVILIZATION WITH ITS KNOWLEDGE SYSTEMS AND TRADITIONS

L T P C

3 0 0 3

OBJECTIVES

- To enhance the role of Indian knowledge systems in shaping cultural practices and societal norms.

UNIT I FOUNDATIONS OF INDIAN CULTURE:

- Historical Evolution: Key Periods and Events
- Major Cultural and Religious Traditions

UNIT II INDIAN KNOWLEDGE SYSTEMS:

- Traditional Systems: Ayurveda, Yoga, and Classical Sciences
- Philosophy and Spirituality: Major Schools of Thought

UNIT III INTEGRATION OF KNOWLEDGE AND TRADITION:

- Role of Knowledge Systems in Shaping Culture
- Preservation and Modern Adaptation of Traditions

UNIT IV CURRENT TRENDS AND FUTURE DIRECTIONS:

- Contemporary Challenges and Innovations
- Future Prospects for Indian Knowledge Systems and Culture

OUTCOMES

Upon completion of the course, the students will be able to:

- Evaluate the influence of Indian knowledge systems on cultural development and the balance between tradition and modernity.


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23IKS03

VISION FOR A HUMAN SOCIETY

L T P C
3 0 0 3

OBJECTIVES

- To impart knowledge on the core values in Indian philosophy and compare them with ethical principles from global traditions.

UNIT I CONCEPT OF VASUDHAIVA KUTUMBAKAM:

- Ancient Indian Philosophy on Universal Unity
- Application in Modern Society

UNIT II HUMANISTIC VALUES AND ETHICAL PRINCIPLES:

- Core Values in Indian Philosophy
- Comparative Analysis with Global Philosophies

UNIT III SOCIAL HARMONY AND GLOBAL CITIZENSHIP:

- Practices and Strategies for Social Integration
- Case Studies of Global Harmony Initiatives

UNIT IV SUSTAINABLE DEVELOPMENT AND WELL-BEING:

- Indian Approaches to Sustainability
- Integrating Traditional Wisdom with Modern Development

OUTCOMES

Upon completion of the course, the students will be able to:

- Apply traditional wisdom in creating sustainable and balanced development solutions.


Chairman - BOS





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23IKS04

INDIAN SCIENCE, ENGINEERING, AND TECHNOLOGY - PAST,
PRESENT & FUTURE

L T P C

3 0 0 3

OBJECTIVES

- To acquire the major achievements and institutions in contemporary Indian science and technology, and assess current trends and future directions.

UNIT I ANCIENT INDIAN SCIENTIFIC CONTRIBUTIONS:

- Key Texts: Sulbasutras, Aryabhatiya, Sushruta Samhita
- Innovations in Mathematics, Medicine, and Astronomy

UNIT II MEDIEVAL AND EARLY MODERN CONTRIBUTIONS:

- Developments in Metallurgy, Navigation, and Architecture
- Influence on Islamic and European Science

UNIT III MODERN INDIAN SCIENCE AND TECHNOLOGY:

- Major Achievements and Institutions
- Current Trends and Future Directions

UNIT IV INTEGRATION OF TRADITIONAL AND MODERN KNOWLEDGE:

- Case Studies of Successful Integrations
- Challenges and Opportunities for Future Innovations

OUTCOMES

Upon completion of the course, the students will be able to:

- Identify the developments in medieval and early modern Indian science and their global influence.


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23IKS05

INDIAN TOWN PLANNING AND ARCHITECTURE

L T P C
3 0 0 3

OBJECTIVES

- To gain knowledge on the sustainable urban planning practices and contemporary architectural innovations.

UNIT I ANCIENT AND MEDIEVAL TOWN PLANNING:

- Vedic, Mauryan, and Gupta Urban Planning
- Mughal Architecture and City Layouts

UNIT II CLASSICAL INDIAN ARCHITECTURE:

- Temples, Forts, and Palaces
- Architectural Styles and Techniques

UNIT III COLONIAL AND POST-COLONIAL URBAN DEVELOPMENT:

- Impact of British Urban Planning
- Modern Architectural Movements in India

UNIT IV CONTEMPORARY CHALLENGES AND INNOVATIONS:

- Sustainable Urban Planning
- Modern Indian Architectural Practices

OUTCOMES

Upon completion of the course, the students will be able to:

- Evaluate the impact of colonial urban planning and identify key modern architectural movements in India.


Chairman - BoS





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23IKS06

INDIAN MATHEMATICS AND ASTRONOMY

L T P C
3 0 0 3

OBJECTIVES

- To inculcate the mathematical achievements of Aryabhata, Brahmagupta, and Bhaskara, and their influence on the development of Indian mathematics..

UNIT I HISTORICAL DEVELOPMENT OF INDIAN MATHEMATICS:

- Key Figures: Aryabhata, Brahmagupta, Bhaskara
- Major Texts and Contributions

UNIT II INDIAN ASTRONOMY:

- Ancient Astronomical Texts: Siddhantas
- Contributions to Cosmology and Celestial Mechanics

UNIT III MATHEMATICAL TECHNIQUES AND INNOVATIONS IMPACT OF BRITISH URBAN PLANNING:

- Concepts of Zero, Decimal System, Algebra
- Mathematical Problems and Solutions

UNIT IV INFLUENCE ON GLOBAL MATHEMATICS AND ASTRONOMY:

- Transmission of Knowledge to the Arab World and Europe
- Legacy in Modern Scientific Thought

OUTCOMES

Upon completion of the course, the students will be able to:

- Construct the significance of Indian mathematical and astronomical knowledge in global scientific development and its legacy in contemporary science.


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23IKS07

INDIAN AESTHETICS (INCLUDING MUSIC & MUSICAL
INSTRUMENTS)/ARTHASHASTRA

L T P C

3 0 0 3

OBJECTIVES

- To instruct the classical music traditions of Hindustani and Carnatic music, including their distinct features, evolution, and the role of musical instruments in these traditions.

UNIT I CLASSICAL INDIAN AESTHETICS KEY TEXTS:

- Principles of Rasa, Bhava, and Natya
- Key Texts: Natyashastra, Abhinavabharati

UNIT II INDIAN MUSIC TRADITIONS:

- Classical Music: Hindustani and Carnatic
- Musical Instruments and Their Evolution

UNIT III ARTHASHASTRA AND ECONOMIC THOUGHT:

- Key Concepts and Texts: Arthashastra by Kautilya
- Application of Economic Principles in Ancient India

UNIT IV INTEGRATION OF TRADITIONAL AND MODERN KNOWLEDGE:

- Case Studies and Historical Examples
- Modern Relevance and Application

OUTCOMES

Upon completion of the course, the students will be able to:

- Apply the integration of aesthetic and economic principles in historical and modern contexts, recognizing their relevance in contemporary society.


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23IKS08

INDIAN HEALTH, WELLNESS, AND PSYCHOLOGY -
INCLUDING AYURVEDA

L T P C

3 0 0 3

OBJECTIVES

- To enhance the current trends in Indian health and wellness practices, including their impact on global health and wellness movements.

UNIT I INTRODUCTION TO AYURVEDA:

- Core Principles: Doshas, Dhatus, and Malas
- Traditional Healing Practices

UNIT II INDIAN CONCEPTS OF WELLNESS AND HEALTH:

- Yoga and Meditation: Techniques and Benefits
- Traditional Dietary Practices

UNIT III PSYCHOLOGICAL THEORIES AND PRACTICES:

- Ancient Indian Perspectives on Mind and Behavior
- Comparative Analysis with Modern Psychology

UNIT IV CONTEMPORARY APPLICATIONS:

- Integration of Ayurveda and Modern Medicine
- Current Trends in Indian Health and Wellness Practices

OUTCOMES

Upon completion of the course, the students will be able to:

- Apply the integration of Ayurvedic and modern medical practices, and understand current trends in health and wellness..


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23IKS09

INDIAN SYSTEM OF PROOF AND LOGIC (INCLUDING NYAY SHASTRA)

L T P C

3 0 0 3

OBJECTIVES

- To acquire the methodologies and techniques employed in Nyay Shastra for establishing logical proofs.

UNIT I FOUNDATIONS OF INDIAN LOGIC:

- Introduction to Nyay Shastra (Indian Logic)
- Key Concepts: Pramana (Means of Knowledge), Nyaya (Logic), and Tarka (Inference)

UNIT II SYSTEMATIC ANALYSIS OF PROOFS:

- Types of Proofs: Direct, Indirect, and Hypothetical
- Methodologies in Nyay Shastra

UNIT III COMPARISON WITH WESTERN LOGIC:

- Similarities and Differences
- Influence on Modern Logical Systems

OUTCOMES

Upon completion of the course, the students will be able to:

- Evaluate the influence of Indian logical principles on modern logical systems and contemporary thought.


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23IKS10

INDIAN LINGUISTICS AND PHONETICS

L T P C
3 0 0 3

OBJECTIVES

- To gain knowledge on the classical and modern Indian languages, including their historical context, features, and contemporary relevance.

UNIT I PANINI'S GRAMMAR:

- Overview of Ashtadhyayi
- Key Concepts: Sandhi, Vibhakti, and Dhatu

UNIT II INDIAN PHONETICS:

- Articulation and Pronunciation
- Phonological Features in Indian Languages

UNIT III OVERVIEW OF INDIAN LANGUAGES:

- Classical Languages: Sanskrit, Tamil, Kannada
- Major Modern Languages: Hindi, Bengali, Urdu

OUTCOMES

Upon completion of the course, the students will be able to:

- Examine the phonological features and systems used in various Indian languages.


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23IKS11

INDIAN GOVERNANCE, ADMINISTRATION, AND
MANAGEMENT SYSTEMS (INCLUDING ARTHASHASTRA)

L T P C

3 0 0 3

OBJECTIVES

- To instruct the governance methods and political strategies outlined in the Arthashastra and their application in ancient times.

UNIT I ARTHASHASTRA AND ANCIENT INDIAN ADMINISTRATION:

- Key Principles and Texts
- Governance and Political Strategies

UNIT II HISTORICAL ADMINISTRATIVE SYSTEMS:

- Mauryan and Gupta Administration
- Mughal and Colonial Administrations

UNIT III MODERN INDIAN GOVERNANCE:

- Constitutional Framework
- Administration and Management Practices

OUTCOMES

Upon completion of the course, the students will be able to:

- Construct the Indian constitutional framework and contemporary administrative practices, enabling them to analyze current governance and management systems.


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23IKS12

INDIAN PHYSICS (E.G., VAISHESHIK)

L T P C
3 0 0 3

OBJECTIVES

- To inculcate how vaisheshik principles contributed to classical and quantum theories, and their relevance to modern physics..

UNIT I PRINCIPLES OF VAISHESHIK PHYSICS:

- Key Concepts: Atoms, Categories of Reality
- Contributions to Classical and Quantum Theories

UNIT II HISTORICAL DEVELOPMENT:

- Evolution of Physical Theories in Ancient India
- Influence on Modern Physics

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze how ancient Indian physical theories have influenced modern physics and their relevance to current scientific discussions..


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23IKS13

TEXTILE INDUSTRY IN INDIA

L T P C
3 0 0 3

OBJECTIVES

- To acquire the traditional and modern textile practices, including handloom weaving and dyeing techniques.

UNIT I HISTORICAL OVERVIEW:

- Traditional Textile Practices: Handloom, Dyeing Techniques
- Historical Significance of Indian Textiles

UNIT II MODERN TEXTILE INDUSTRY:

- Major Players and Technologies
- Challenges and Innovations

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the challenges faced by the textile industry and evaluate the innovations that are shaping its future


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23IKS14

SHIPBUILDING AND MARITIME TRADE

L T P C
3 0 0 3

OBJECTIVES

- To impart knowledge on the ancient shipbuilding techniques and innovations used in various civilizations.

UNIT I ANCIENT SHIPBUILDING TECHNIQUES:

- Traditional Textile Practices: Handloom, Dyeing Techniques
- Historical Significance of Indian Textiles

UNIT II MODERN MARITIME INDUSTRY:

- Shipbuilding Technologies
- Trade Policies and Economic Impact

OUTCOMES

Upon completion of the course, the students will be able to:

- Construct the ancient and latest shipbuilding technologies and their applications in the maritime industry.


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23IKS15

TRANSPORT SYSTEMS IN INDIA

L T P C
3 0 0 3

OBJECTIVES

- To enhance the ancient and current state of railways, roadways, and airways, including their infrastructure and operational aspects.

UNIT I HISTORICAL TRANSPORT SYSTEMS:

- Ancient Roadways and Waterways
- Development During British and Post-Independence Period

UNIT II CONTEMPORARY TRANSPORT INFRASTRUCTURE SHIPBUILDING TECHNOLOGIES:

- Railways, Roadways, Airways
- Challenges and Future Prospects

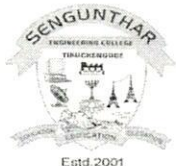
OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze the ancient current challenges in the transport sector and evaluate future prospects and potential solutions.


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23IKS16

PRINCIPLES AND PRACTICE OF MECHANICS AND MACHINES

L T P C
3 0 0 3

OBJECTIVES

- To inculcate the ancient and current Indian contributions to mechanics, including notable inventions and principles.

UNIT I HISTORICAL MECHANICS:

- Ancient Indian Contributions to Mechanics
- Classical Texts on Engineering and Machinery

UNIT II MODERN APPLICATIONS:

- Principles of Mechanics
- Practical Applications and Innovations

OUTCOMES

Upon completion of the course, the students will be able to:

- Identify practical applications and innovations in the field of mechanics and machinery..


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23IKS17

WATER MANAGEMENT IN INDIA

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3 0 0 3

OBJECTIVES

- To acquire the traditional and contemporary water management techniques and policies.

UNIT I TRADITIONAL WATER MANAGEMENT PRACTICES:

- o Ancient Indian Contributions to Mechanics
- o Historical Case Studies

UNIT II CONTEMPORARY WATER MANAGEMENT:

- o Modern Techniques and Policies
- o Challenges and Solutions

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze traditional and current challenges in water management and evaluate possible solutions and strategies for improvement.


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23IKS18

ECOLOGY AND GEOGRAPHY IN INDIA

L T P C
3 0 0 3

OBJECTIVES

- To impart the India's biodiversity and the various conservation efforts aimed at preserving its natural resources and species.

UNIT I INDIAN ECOLOGY:

- Major Ecosystems: Forests, Deserts, Wetlands
- Biodiversity and Conservation Efforts

UNIT II INDIAN GEOGRAPHY:

- Physical and Human Geography
- Environmental Challenges and Policies

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze environmental challenges and evaluate the effectiveness of policies and strategies designed to address these challenges.


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23IKS19 NATURAL AGRICULTURE AND HORTICULTURE PRACTICES IN INDIA

L T P C
3 0 0 3

OBJECTIVES

- To instruct the sustainable agricultural practices, including methods that enhance soil health, conserve water, and promote biodiversity.

UNIT I TRADITIONAL AGRICULTURAL PRACTICES:

- o Vriksha Ayurveda and Natural Farming Techniques
- o Historical and Cultural Significance

UNIT II MODERN PRACTICES:

- o Sustainable Agriculture
- o Innovations and Technological Advances

OUTCOMES

Upon completion of the course, the students will be able to:

- Develop knowledge of sustainable agriculture practices and their importance for environmental health and productivity.


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23IKS20

INDIAN ECONOMICS (ARTHASHASTRA)

L T P C
3 0 0 3

OBJECTIVES

- To gain knowledge how the principles of the Arthashastra can be applied to modern economic strategies and policies.

UNIT I PRINCIPLES OF ARTHASHASTRA:

- Key Concepts and Economic Policies
- Historical Context and Influence

UNIT II ECONOMIC PRACTICES AND POLICIES:

- Comparison with Modern Economic Theories
- Application in Contemporary Economic Strategies

OUTCOMES

Upon completion of the course, the students will be able to:

- Examine how ancient economic principles can be applied to contemporary economic strategies and policies, assessing their relevance and practicality.


Chairman - Bos

