



SENGUNTHAR ENGINEERING COLLEGE (AUTONOMOUS)

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

TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



CURRICULUM & SYLLABI B.E. MECHANICAL ENGINEERING (CHOICE BASED CREDIT SYSTEM) REGULATIONS-2023

(I - IV SEMESTER)

(For the students admitted from the Academic year 2023-24)



Note: The regulations here under 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 under going the programme under the same Regulation as may be decided by the Academic Council.





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Chairman - BoS


DEAN (ACADEMICS)
SENGUNTHAR ENGINEERING COLLEGE
TIRUCHENGODE-637 205


PRINCIPAL
SENGUNTHAR ENGINEERING COLLEGE
(AUTONOMOUS)
TIRUCHENGODE - 637 205





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REGULATIONS 2023

CHOICE BASED CREDIT SYSTEM

B. E. MECHANICAL ENGINEERING

VISION

To be a centre of excellence for producing skilled mechanical engineers with strong ethical values, entrepreneurial spirit and expertise in advanced technologies, including sustainable engineering solutions.

MISSION

M1: To equip mechanical engineers with knowledge, skills, and ethical values to address global challenges.

M2: To foster sustainable growth by conducting research and development activities

M3: To cultivate a culture of creativity, entrepreneurship and industry-focused collaboration, driving impactful advancements in mechanical engineering.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates can

- Acquire a strong foundation in engineering principles, enabling them to design, analyze, and implement innovative solutions to society.
- Engage in higher education and continuous professional development to stay updated with emerging technologies and global trends.
- Develop the capability to design, execute, and expand cost-effective entrepreneurial solutions that drive long-term economic stability and sustainable growth.





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PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO1	Engineering knowledge	Apply knowledge of mathematics, science, engineering fundamentals and engineering specialization to solve complex engineering problems.
PO2	Problem analysis	Identify, formulate, review research literature and analyze complex engineering problems using principles of mathematics, natural sciences and engineering sciences.
PO3	Design / development of solutions	Design solutions for complex engineering problems considering public health, safety, cultural, societal and environmental aspects.
PO4	Conduct investigations of complex problems	Use research-based knowledge and methods, including experiments, data analysis and interpretation, to provide valid conclusions.
PO5	Modern tool usage	Create, select and apply appropriate techniques, resources and modern engineering and IT tools to solve complex engineering problems.
PO6	The Engineer and Society	Apply contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7	Environment and Sustainability	Understand and evaluate the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of sustainable development.
PO8	Ethics	Apply ethical principles and commit to professional ethics, responsibilities and norms of engineering practice.
PO9	Individual and team work	Function effectively as an individual and as a member or leader in diverse teams and multidisciplinary settings.
PO10	Communication	Communicate effectively on complex engineering activities with the engineering community and society through reports, presentations and documentation.
PO11	Project management and finance	Demonstrate knowledge and understanding of engineering management principles and apply these to one's own work as a member or leader of a team
PO12	Life-long learning	Recognize the need for and engage in independent and life-long learning in the broadest context of technological change

PROGRAM SPECIFIC OUTCOME (PSOs)

PSO1	Apply the principles of mechanical engineering to design complex problems using solid works and automation.
PSO2	Utilize DFMA techniques to manufacture and assemble components designed to address tangible challenges across various industries.



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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	12	1	2
I	I	23SHT101 - Professional English	1	1	1.5	2	1	-	-	1.8	3	1.5	2	2	-	-
		23HST102 - Heritage of Tamil	-	-	-	-	-	-	-	2	1	2	-	1	-	-
		23MAT101 - Matrices and Calculus	3	3	2	-	-	-	-	-	-	-	-	2	-	-
		23PHE101 - Engineering Physics	3	3	1	1	-	-	-	-	-	-	-	-	-	-
		23CYE101 - Chemistry for Engineers	2.5	2.17	2.67	2.2	2	2	2	1.83	1.6	1.6	1.33	2.33	-	-
		23GEE101 - Programming in C	2.83	2.67	2.17	1.5	2.83	-	-	1	1	1.5	1	2	-	-
		23EEC101 - Soft Skills & Life Skills	1.25	1.6	1	1	3	1.4	1.4	2	2.6	2.8	2.6	2	-	-
		23MDC101 - Induction Program (2 Weeks)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	II	23MAT201 - Statistics and Numerical Methods	3	3	2	2	2	-	-	-	-	-	-	1	-	-
		23PHT201 - Advanced Physics of Materials	2	3	2	1	1.8	1	1	1	-	-	-	-	-	-
		23CYT201 - Environmental Sciences and Sustainability	2	1.4	3	1.6	2.2	3	3	3	0.8	1.6	2.4	2.2	-	-





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Year	Sem	Course Name	PO												PSO	
			1	2	3	4	5	6	7	8	9	10	11	12	1	2
I	II	23MET201 - Manufacturing Processes	3	2.4	2.0	1.2	1.2	-	-	-	-	-	-	-	3	2.6
		23GET201- Engineering Graphics	3	2	2	-	3	1	-	-	-	-	-	2	2	-
		23HST202 - தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	-	-	-	-	-	-	-	2	1	2	-	1	-	-
		23HSE201 - English for Engineers: Theory and Practice	1	2	-	2	1	2	2	1.5	2.33	3	2	1.66	-	-
		23GEL201 - Engineering Practice Laboratory	3	2	-	-	1	1	1	1	-	-	-	-	2	-
		Indian Language (Except Mother Tongue)/Foreign Language														
		23EEEC201 - Hindi	-	-	-	-	-	1.0	1.0	1.3	1.6	2.8	-	1.6	-	-
		23EEEC201 - German	-	-	-	-	-	1.0	1.0	1.5	1.7	3.0	-	1.6	-	-
		23EEEC201 - Japanese	-	-	-	-	1.4	1.6	1.6	1.0	0.2	2.6	-	1.0	-	-
		23MDC201 - Aptitude skills	-	-	-	-	-	-	-	-	-	-	-	-	-	-
II		23MAT304 - Transforms and Partial Differential Equations	3	3	2	2	2	-	-	-	-	-	-	2	-	-
		23MET301 - Engineering Thermodynamics	3	2	2	-	3	-	-	-	-	3	-	2	3	2
		23MET302 - Engineering Mechanics	3	2	2	-	-	-	-	-	-	-	-	2	-	2





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Year	Sem	Course Name	PO												PSO	
			1	2	3	4	5	6	7	8	9	10	11	12	1	2
II	III	23MEE301 - Manufacturing Technology	3	2.67	2.0	2.0	2.3	-	-		-	-	-	-	3.0	2.3
		23MEE303 - Metrology and Measurement	3	1	-	-	2	-	-	-	2	-	-	2	-	2
		23CEE402 - Fluid Mechanics and Machinery	3	3	2	2	-	2	2	2	-	2	-	2	3	2
		23EEEC301 - Professional Development	2.3	1.6	2	2	3	-	-	-	-	1.5	2.6	1	2	2
II	IV	23MET402 - Kinematics of Machinery	3	2	2	-	-	-	-	-	-	-	-	2	1	2
		23MET403 - Engineering Materials and Metallurgy	3	2	-	-	-	-	-	-	-	-	-	2	1	2
		23MEE401 - Thermal Engineering	3	3	2	-	-	1	1	-	2	-	-	3	2	2
		23MEE402 - Strength of Materials	3	3	1	-	-	1	1	-	2	-	-	3	2	2
		23GEE301 - Problem solving and Python Programming	2.83	2.67	2.17	1.5	2.83	-	-	1	1	1.5	1	2	-	-
		23EEEC401 - Online Certification Courses	-	-	-	-	-	-	-	-	-	-	-		-	-





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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 - MECHANICAL 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
23HST102	தமிழர்மரபு/Heritage of Tamils	HS	1	0	0	1	40	60	100
23MAT101	Matrices and Calculus	BS	3	1	0	4	40	60	100
23PHE101	Engineering Physics	BS	3	0	2	4	50	50	100
23CYE102	Chemistry for Engineers	BS	3	0	2	4	50	50	100
EMBEDDED COURSE									
23GEE101	Programming in C	ES	3	0	2	4	50	50	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 - MECHANICAL ENGINEERING - SECOND SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks			
			L	T	P		C	CIA	ESE	TOT
THEORY										
23MAT201	Statistics 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	
23MET201	Manufacturing Processes	PC	3	0	0	3	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										
23GEL201	Engineering Practice Laboratory	ES	0	0	4	2	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						26				

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
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T	:	Tutorial
P	:	Practical
C	:	Credit Point
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ESE	:	End Semester Examination
TOT	:	Total





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

B.E - MECHANICAL 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
23MET301	Engineering Thermodynamics	PC	3	1	0	4	40	60	100
23MET302	Engineering Mechanics	PC	3	1	0	4	40	60	100
EMBEDDED COURSE									
23MEE301	Manufacturing Technology	PC	3	0	2	4	50	50	100
23MEE302	Metrology and Measurements	PC	3	0	2	4	50	50	100
23CEE402	Fluid Mechanics and Machinery	ES	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEEC301	Professional Development	EEC	0	0	2	1	100	-	100
TOTAL CREDITS IN SEMESTER - III			25						

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

B.E - MECHANICAL ENGINEERING - FOURTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23MET401	Kinematics of Machinery	PC	3	1	0	4	40	60	100
23MET402	Engineering Materials and Metallurgy	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23MEE401	Thermal Engineering	PC	3	0	2	4	50	50	100
23MEE402	Strength of Materials	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						22			

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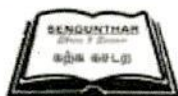
FOR B.E. / B.Tech. DEGREE PROGRAMMES

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

B.E - MECHANICAL ENGINEERING - FIFTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23MET501	Design of Machine Elements	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									
23MEE501	Dynamics of Machinery	PC	3	0	2	4	50	50	100
23MEE502	Heat and Mass Transfer	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC501	Industrial Training	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
GE	:	General Elective
OE	:	Open Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
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(For the Students Admitted in the Academic Year 2023-2024 onwards)

B.E - MECHANICAL ENGINEERING - SIXTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
	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									
23MEE601	Finite Element Analysis	PC	3	0	2	4	50	50	100
23MEE602	Mechatronics and IoT	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					24				

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

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

B.E - MECHANICAL 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
GE	:	General Elective
OE	:	Open 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





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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 - MECHANICAL 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
GE	:	General Elective
OE	:	Open 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





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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
23HST202	தமிழரும் தொழில்நுட்பமும் / Tamils 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
23PHE101	Engineering Physics	BS	3	0	2	4	50	50	100
23CYE102	Chemistry for Engineers	BS	3	0	2	4	50	50	100
23MAT201	Statistics 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	BS	3	0	0	3	40	60	100
23MAT304	Transforms and Partial Differential Equations	BS	3	1	0	4	40	60	100





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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
23GET201	Engineering Graphics	ES	3	0	2	4	50	50	100
23GEL201	Engineering Practices Laboratory	ES	0	0	4	2	60	40	100
23CEE402	Fluid Mechanics and Machinery	ES	3	0	2	4	50	50	100
23GEE301	Problem solving and Python Programming	ES	3	0	2	4	50	50	100

LIST OF PROFESSIONAL CORE

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23MET201	Manufacturing Processes	PC	3	0	0	3	40	60	100
23MET301	Engineering Thermodynamics	PC	3	1	0	4	40	60	100
23MET302	Engineering Mechanics	PC	3	1	0	4	40	60	100
23MEE301	Manufacturing Technology	PC	3	0	2	4	50	50	100
23MEE302	Metrology and Measurement	PC	3	0	2	4	50	50	100
23MET401	Fluid Power Systems	PC	3	0	0	3	40	60	100
23MET402	Kinematics of Machinery	PC	3	1	0	4	40	60	100
23MET403	Engineering Materials and Metallurgy	PC	3	0	0	3	40	60	100
23MEE401	Thermal Engineering	PC	3	0	2	4	50	50	100
23MEE402	Strength of Materials	PC	3	0	2	4	50	60	100
23MET501	Design of Machine Elements	PC	3	1	0	4	40	60	100
23MEE501	Dynamics of Machinery	PC	3	0	2	4	50	50	100
23MEE502	Heat and Mass Transfer	PC	3	0	2	4	50	50	100
23MEE601	Finite Element Analysis	PC	3	0	2	4	50	50	100
23MEE602	Mechatronics	PC	3	0	2	4	50	50	100





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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
23MEP501	Welding Technology	PE	3	0	0	3	40	60	100
23MEP502	Non-Destructive Test and Evaluation of Materials	PE	3	0	0	3	40	60	100
23MEP503	Composite Materials	PE	3	0	0	3	40	60	100
23MEP504	Green Manufacturing	PE	3	0	0	3	40	60	100
23MEP505	Unconventional Machining Processes	PE	3	0	0	3	40	60	100
23MEP506	Metal Casting Technology	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
23MEP507	Hybrid and Vehicle Technology	PE	3	0	0	3	40	60	100
23MEP508	Automobile Engineering	PE	3	0	0	3	40	60	100
23MEP509	Design of Heat Exchangers	PE	3	0	0	3	40	60	100
23MEP510	Computational Fluid Dynamics	PE	3	0	0	3	40	60	100
23MEP511	Refrigeration and Air Conditioning	PE	3	0	0	3	40	60	100
23MEP512	Solar Thermal System	PE	3	0	0	3	40	60	100





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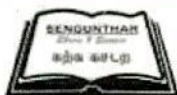


Professional Elective - III

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		CIA	ESE	TOT
23MEP513	Product Design and Development	PE	3	0	0	3	40	60	100
23MEP514	Computer Applications in Design	PE	3	0	0	3	40	60	100
23MEP515	Fluid Power Systems	PE	3	0	0	3	40	60	100
23MEP516	Process Planning and Cost Estimation	PE	3	0	0	3	40	60	100
23MEP517	Power Plant Engineering	PE	3	0	0	3	40	60	100
23MEP518	Additive Manufacturing	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
23MEP601	CAD/CAM	PE	3	0	0	3	40	60	100
23MEP602	Design for X	PE	3	0	0	3	40	60	100
23MEP603	Lean Manufacturing	PE	3	0	0	3	40	60	100
23MEP604	Production Planning and Control	PE	3	0	0	3	40	60	100
23MEP605	Computer Integrated Manufacturing Systems	PE	3	0	0	3	40	60	100
23MEP606	Sustainable Manufacturing	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
23MEP607	Indutstry 4.0	PE	3	0	0	3	40	60	100
23MEP608	Instrumentation and control Engineering	PE	3	0	0	3	40	60	100
23MEP609	Surface Engineering	PE	3	0	0	3	40	60	100
23MEP610	Maintenance Engineering	PE	3	0	0	3	40	60	100
23MEP611	Electronics Manufacturing Technology	PE	3	0	0	3	40	60	100
23MEP612	Design for Additive Manufacturing	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
23MEP613	Machine Drawing	PE	3	0	0	3	40	60	100
23MEP614	Material Handling and Solid Processing Equipment	PE	3	0	0	3	40	60	100
23MEP615	Design of Jigs and Fixtures	PE	3	0	0	3	40	60	100
23MEP616	Gas Dynamics and Jet Propulsion	PE	3	0	0	3	40	60	100
23MEP617	Design of Transmission Systems	PE	3	0	0	3	40	60	100
23MEP618	Fuel Cells	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 / Pharmaceutical Nanotechnology	OE	3	0	0	3	40	60	100
MATHEMATICS	23MAO606 / Graph Theory	OE	3	0	0	3	40	60	100





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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	23EEO709 / 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
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





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OPEN ELECTIVES – III

Offered by the Departments	Course Code / Course Name	Category	Periods / Week				Credit	Maximum Marks		
			L	T	P	C		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	23EEO716 / 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
MEDICAL ELECTRONICS	23MDO719 / Wearable Technology	OE								
	23MDO723 / Medical Waste Management		3	0	0	3		40	60	100
	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





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GENERAL ELECTIVES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		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 WING LEVEL - 3	GE	3	0	0	3	40	60	100
23NCCL04	NCC ARMY WING 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		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





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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
23EEC301	Professional Development	EEC	0	0	2	1	100	-	100
23EEC401	Online Certification Courses	EEC	3	0	0	3	100	-	100
23EEC501	Industrial Training	EEC	0	0	4	2	100	-	100
23MEJ601	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
23MEJ801	Product Development	EEC	0	0	12	6	40	60	100
23EEC801	Internship	EEC	0	0	4	2	100	-	100





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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	-	-	-

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. MECHANICAL ENGINEERING

Category	Credits Per Semester								Credit Total
	I	II	III	IV	V	VI	VII	VIII	
HS	4	8	-	-	-	-	3	-	15
BS	12	7	4	-	-	-	-	-	23
ES	4	6	4	4	-	-	-	-	18
PC	-	3	16	15	12	8	-	-	54
PE	-	-	-	-	9	9	-	-	18
GE	-	-	-	-	-	-	3	-	03
OE	-	-	-	-	-	3	6	-	09
EEC	1	2	1	3	2	4	4	8	25
MC	-	-	-	-	-	-	-	-	-
Total	21	26	25	22	23	24	16	08	165





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SEMESTER I

23HST101

PROFESSIONAL ENGLISH

L T P C

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

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





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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 Under graduate 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	PO12	PSO1	PSO2
1	1	-	-	-	1	-	-	2	3	-	2	2	-	-
2	1	-	-	-	1	-	-	2	3	-	2	2	-	-
3	-	1	2	-	1	-	-	2	3	1	2	2	-	-
4	-	-	1	-	-	-	-	2	3	2	2	2	-	-
5	1	1	-	2	1	-	-	1	3	-	2	2	-	-
Avg.	1	1	1.5	2	1	-	-	1.8	3	1.5	2	2	-	-

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

[Signature]
Chairman - BoS





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TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



23HST102

HERITAGE OF TAMILS

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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 - Azhvars 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, KaniyanKoothu, Oyilattam, 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

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 Thina concepts, trade and victory of Chozha dynasty.
- Interpret the contribution of Tamils in Indian freedom struggle, Self-esteem movement and siddha medicine.





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TEXT-CUM-REFERENCE BOOKS

1. தமிழகவரலாறு - மக்களும்பண்பாடும் - 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. 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.)
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	PO12	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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23HST102

தமிழர் மரபு

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நோக்கங்கள்

மாணவர்கள்கண்டிப்பாகஅறியவேண்டுவன:

- செம்மொழியானதமிழ்மொழியின்விரிவானஇலக்கியத்தைப்பற்றிஅறிதல்.
- பாறைஓவியங்கள்முதல்நவீனஓவியங்கள்வரைஉள்ளகலைகளைபகுப்பாய்வு செய்தல்.
- நாட்டுப்புறக்கலைகள்மற்றும்வீரவிளையாட்டுகளைப்புரிந்துகொள்ளுதல்.
- தமிழர்களின்திணைக்கோட்பாடுகளைச்செயல்படுத்துதல்.
- இந்தியவிடுதலைப்போராட்டத்திற்கும்பண்பாட்டிற்கும்மற்றும்தமிழர்களின்பங்களிப்பைஉணருதல்.

UNIT I மொழி மற்றும் இலக்கியம்

3

இந்திய மொழி குடும்பங்கள்- திராவிட மொழிகள் -தமிழ் ஒரு செம்மொழி -தமிழ் செவ்விலக்கியங்கள்- சங்க இலக்கியத்தில் சமய சார்பற்ற தன்மை- சங்க இலக்கியத்தில் பகிர்தல் அறம்- திருக்குறளில் மேலாண்மை கருத்துக்கள் -தமிழ் காப்பியங்கள்- தமிழகத்தில் பௌத்த சமயங்களின் தாக்கம் -பக்தி இலக்கியம் ஆழ்வார்கள் மற்றும் நாயன்மார்கள்- சிற்றிலக்கியங்கள் -தமிழில் நவீன இலயக்கியத்தின் வளர்ச்சி -தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு

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

3

நடுகல் முதல் நவீன சிற்பங்கள் வரை -ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினை பொருட்கள் ,பொம்மைகள் -தேர் செய்யும் கலை-சுடுமண் சிற்பங்கள் -நாட்டுப்புற தெய்வங்கள்- குமரி முனையில் திருவள்ளுவர் சிலை-இசை கருவிகள் -மிருதங்கம் ,பறை ,வீணை,யாழ், நாதஸ்வரம் ,தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

UNIT III நாட்டுப்புற கலைகள் மற்றும் வீர விளையாட்டுகள்

3

தெருக்கூத்து,கரகாட்டம் ,வில்லுப்பாட்டு, கணியான் கூத்து ,ஓயிலாட்டம், தோல்பாவை கூத்து,சிலம்பாட்டம், வளரி ,புலியாட்டம், தமிழர்களின் விளையாட்டுகள்

UNIT IV தமிழர்களின் திணைக்கோட்பாடுகள்

3

தமிழகத்தின் தாவரங்களும் , விலங்குகளும் -தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறகோட்பாடுகள்-தமிழர்கள் போற்றிய அறக்கோட்பாடு -சங்க காலத்தில் தமிழகத்தில் எழுத்தறிவு,கல்வியும்- சங்க கால நகரங்களும் துறை முகங்களும் -சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி -கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.

UNIT V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்கு தமிழர்களின் பங்களிப்பு

3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு- இந்தியாவின் பிறபகுதிகளில் தமிழ்பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்தமருத்துவத்தின் பங்கு- கல்வெட்டுகள், கையெழுத்துப்படிகள் -தமிழ் புத்தகங்களின் வரலாறு

TOTAL: 15 PERIODS





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முடிவுகள்

பாடத்தின் முடிவில், மாணவர்கள் அறிந்து கொள்வன:

- தமிழ்மொழியின் செம்மொழி தன்மையையும் சங்கஇலக்கியத்தின் முக்கியத்துவத்தையும் உணர்வார்கள்.
- தமிழர்களின் சிற்ப, ஓவிய, இசை மரபுகளை புரிந்து கொள்வார்கள்.
- நாட்டுப்புறக் கலைகளையும் வீர விளையாட்டுகளையும் வகைப்படுத்துவார்கள்.
- தமிழர்களின் திணைக்கோட்பாடுகளும் சங்ககாலவர்த்தகமும் புரிந்து கொள்வார்கள்.
- இந்திய விடுதலைப்போராட்டம், சுயமரியாதை இயக்கம், சித்தமருத்துவம் ஆகியவற்றில் தமிழர்களின் பங்களிப்பை விளக்குவார்கள்.

உரைமற்றும் குறிப்புத்தகங்கள்

1. தமிழகவரலாறு - மக்களும் பண்பாடும் - கே. கே. பிள்ளை (வெளியீடு : தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகரநாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை - 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.)
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	PO12	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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23MAT101

MATRICES AND CALCULUS

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

L T P C

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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, 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.





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LIST OF TUTORIALS

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, Forty Third Edition, 2014.
2. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, Seventh Edition, 2015.

REFERENCES

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

E-RESOURCES

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

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	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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23PHE101

ENGINEERING PHYSICS

L T P C

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

3 0 2 4

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

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 Equation: Time independent and time dependent equations - Scanning Electron Microscope - Transmission Electron Microscope - Quantum Tunneling & Scanning Tunneling Electron Microscope

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 – Thermal Conductivity Lee's disc method: Theory and Experiment - Geothermal Energy - Geothermal power - Thermal battery - Thermal Energy Storage.





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LIST OF EXPERIMENTS

(Any Eight experiments to be conducted)

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

TOTAL:45+15=60PERIODS

OUTCOMES

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

- Apply crystallographic knowledge to get familiar with 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.
- Evaluate fundamental properties of materials—such as wavelength, particle size, elastic constants, ultrasonic velocity, viscosity, thermal conductivity and electrical resistance.

TEXT BOOKS

1. P.Mani, "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", McGraw Hill, 2017.

REFERENCES

1. Askeland, D. "Materials Science and Engineering". Brooks/Cole, 2010.
2. Wahab, M.A. "Solid State Physics: Structure and Properties of Materials" Narosa Publishing House, 2009
3. K.Thyagarajan and A.Ghatak. "Lasers: Fundamentals and Applications", Laxmi Publications, (Indian Edition), 2019
4. D.Halliday, R.Resnick and J.Walker. "Principles of Physics", Wiley (Indian Edition), 2015

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	PO12	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	-	-	-	-	-	-	-	-	-	-
6	3	3	1	1	-	-	-	-	-	-	-	-	-	-
Avg.	3	3	1	1	-	-	-	-	-	-	-	-	-	-

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


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23CYE102

CHEMISTRY FOR ENGINEERS

(Common to CIVIL, MECH, R&A)

L T P C

3 0 2 4

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

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 - H₂ - O₂ 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 - 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.





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LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

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

TOTAL: 45 + 15 PERIODS

OUTCOMES

Upon completion of the course, 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.
- Determine the water quality parameters and perform quantitative chemical analysis by pH meter, flame photometry, conductometry and potentiometry

TEXT BOOKS

1. Jain P.C and Monika Jain, "Engineering Chemistry", Dhanpet Rai Publishing Company (P) Ltd., 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", S. Chand & Company Ltd, 2015.
2. Shobha Ramakrishnan, Banani Mukhopadhyay, "Essentials of Analytical Chemistry" Pearson Education India, 2018.

E-RESOURCES

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





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Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	1	3	-	1	-	-	3	-	-	-	-	-	-
2	2	2	3	2	1	2	2	2	2	2	1	2	-	-
3	3	3	3	3	3	2	2	2	2	2	2	3	-	-
4	2	2	2	3	3	2	2	2	1	1	1	-	-	-
5	3	2	3	2	3	2	2	1	2	1	-	2	-	-
6	3	3	2	1	1	2	2	1	1	2	-	-	-	-
Avg.	2.50	2.17	2.67	2.20	2.00	2.00	2.00	1.83	1.60	1.60	1.33	2.33	-	-

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


Chairman - BoS





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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.





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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.

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.





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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.

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Programs using I/O statements, expressions and decision-making construct.
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.





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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, 2016.

REFERENCES

1. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Juneja, B. L and Anita Seth, "Programming in C", CENGAGE Learning India pvt. Ltd., 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/> - (Stack Operations)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	-	3	-	-	-	-	-	-	2	3	2
2	3	3	2	1	3	-	-	-	-	-	-	2	3	3
3	3	3	3	2	3	-	-	-	-	-	-	2	3	3
4	3	3	3	2	3	-	-	-	-	1	-	2	3	3
5	2	3	2	2	3	-	-	-	-	1	-	2	3	2
6	3	3	3	2	3	-	-	1	1	2	1	2	3	3
Avg.	2.83	2.83	2.5	1.8	3	-	-	1	1	1.33	1	2	3	2.66

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

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23EEC101

SOFT SKILLS & LIFE SKILLS

L T P C

1 0 0 1

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

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.





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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.

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	PO12	PSO1	PSO2
1	1	1	-	-	-	2	2	2	3	2	1	-	-	-
2	1	3	1	1	-	1	1	-	2	3	3	1	-	-
3	-	1	-	-	-	1	1	-	3	3	3	1	-	-
4	2	2	1	1	3	1	1	-	2	3	3	3	-	-
5	1	1	1	-	-	2	2	-	3	3	3	3	-	-
Avg.	1.25	1.6	1	1	3	1.4	1.4	2	2.6	2.8	2.6	2	-	-

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


Chairman - BoS





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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.

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.





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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

23MAT201

STATISTICS AND NUMERICAL METHODS

(Common to Mechanical, R&A and PT)

L T P C

3 1 0 4

OBJECTIVES

- To introduce basic concepts in testing of hypothesis.
- To explore the knowledge of classifications of design of experiments.
- 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 TESTING OF HYPOTHESIS

9+3

Sampling distribution – Testing of significance for single proportion, single mean and difference of means – Test of significance for small samples by 't' test – Snedecor's F- test of significance – Chi-square test : Chi-square test of goodness of fit – Independent of attributes.

UNIT II DESIGN OF EXPERIMENTS

9+3

Basic principles of experimental design – Completely randomised design – Analysis of variance for one way classification – Randomised block design – Analysis of variation for two factor experiments variations – Latin square design.

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: Newton's forward and backward interpolation formulae – Lagrange's interpolation formula – Newton's divided difference formula – Numerical integration by Trapezoidal and Simpson's 1/3 rule – Numerical double integration by Trapezoidal rule.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

9+3

Euler's method – Modified Euler's method – Fourth order Runge - Kutta method for solving first order equations – Taylor's series method – Predictor-corrector methods: Milne's method – Adams-Bash forth method.

OUTCOMES

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

- Apply the concepts of hypothesis testing to analyze small and large sample data.
- Analyze the basic concepts of classifications of design of experiments.
- 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.





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LIST OF TUTORIALS

1. Solving one sample and paired sample 't' Test.
2. Statistical Analysis Using Chi-Square Test.
3. One-Way ANOVA Table
4. Two-Way ANOVA Table
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., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, Tenth Edition, 2015.
2. Dr.Kandasamy. P, Dr.Thilagavathy . K and Dr. Gunavathy .K., "Statistics and Numerical Methods", S. Chand and Company Ltd., 2010.

REFERENCES

1. Burden, R.L and Faires, J.D, "Numerical Analysis", Cengage Learning, Ninth Edition, 2016.
2. Gupta S.C. and Kapoor V.K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, Twelveth Edition, 2020.

E-RESOURCES

1. <https://nptel.ac.in/courses/111/105/111105041/> - (Statistics)
2. <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	PO12	PSO1	PSO2
1	3	3	2	2	2	-	-	-	-	-	-	1	-	-
2	3	3	2	2	2	-	-	-	-	-	-	1	-	-
3	3	3	2	2	2	-	-	-	-	-	-	1	-	-
4	3	3	2	2	2	-	-	-	-	-	-	1	-	-
5	3	3	2	2	2	-	-	-	-	-	-	1	-	-
6	3	3	2	2	2	-	-	-	-	-	-	1	-	-
Avg.	3	3	2	2	2	-	-	-	-	-	-	1	-	-

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 learn the principles of cryogenics and superconductivity and applications.
- To know the application of physics concepts to microscopic and NDT Testing.
- To understand different kind of nano materials and synthesis of nano materials, applications.
- To acquire the knowledge of advanced and smart materials for various engineering applications.
- To study different composite materials and synthesize methods.

UNIT I CRYOGENICS

9

Introduction to Cryogenics - Properties of Cryogenic Fluids- Gas-Liquefaction of Gases and Refrigeration Systems - Cryocoolers -Cryogenic Insulations - Superconductivity: Properties - Type I and Type II Superconductors - BCS theory of Superconductivity - High t_c superconductors - General applications of Superconductors.

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: Types, Glass forming ability of Alloys, Melt spinning process, Applications - Shape Memory Alloys: Phases, Shape Memory Effect, Pseudo elastic effect, NiTi alloy, and applications.

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





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OUTCOMES

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

- Analyze the potential applications of superconductors.
- Develop knowledge on various materials characterization techniques.
- Discuss the fundamentals of nano materials and various synthesise methods.
- Develop knowledge about smart materials and their applications.
- Design methodologies and develop the principles of composite materials.

TEXT BOOKS

1. P.Mani, "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. P.Santhana Ragavan and P. Ramasamy, "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	PO12	PSO1	PSO2
1	2	3	2	1	2	1	1	-	-	-	-	-	-	-
2	2	3	2	1	2	1	1	-	-	-	-	-	-	-
3	2	3	2	1	2	1	1	-	-	-	-	-	-	-
4	2	3	2	1	1	1	1	-	-	-	-	-	-	-
5	2	3	2	1	2	1	1	-	-	-	-	-	-	-
Avg.	2	3	2	1	1.8	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 (c) 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.

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.





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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, 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", Pearson Education, Eighth Edition, 2021.
3. Allen, D. T. and Shonnard, D. R., "Sustainability Engineering: Concepts, Design and Case Studies", Prentice Hall, Third Edition, 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.

E-RESOURCES

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

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	3	-	-	3	3	3	-	-	2	1	-	-
2	2	2	3	2	3	3	3	3	-	-	3	3	-	-
3	2	1	3	2	2	3	3	3	-	2	3	3	-	-
4	2	1	3	2	3	3	3	3	2	3	2	2	-	-
5	2	1	3	2	3	3	3	3	2	3	2	2	-	-
Avg.	2	1.4	3	2	2.8	3	3	3	2	2.7	2.4	2.2	-	-

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

Chairman - BoS





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23MET201

MANUFACTURING PROCESSES

L T P C

3 0 0 3

OBJECTIVES

- To introduce the fundamentals of metal casting processes, pattern design, moulding materials, and casting defects.
- To teach the principles and applications of metal joining processes, including conventional and advanced welding methods.
- To explain bulk deformation processes such as forging, rolling, and drawing, along with their characteristics and defects.
- To teach the principles of sheet metal forming operations and special forming processes used in manufacturing.
- To familiarize learners with plastic materials and the processing techniques used for manufacturing plastic components

UNIT I METAL CASTING PROCESSES

9

Sand casting - Sand moulds - Type of patterns - Pattern materials - Pattern allowances - Types of moulding sand - Properties - Core making - Methods of Sand testing - CO₂ process - moulding machines - Working principle of special casting processes - Shell, investment casting - Pressure die casting - Centrifugal casting - Sand Casting defects.

UNIT II METAL JOINING PROCESSES

9

Introduction to welding processes - Principle of Gas welding and arc welding. Principle of Resistance welding, Gas metal arc welding, submerged arc welding, Tungsten Inert Gas welding, Thermit welding and Electron beam welding- Welding defects.

UNIT III BULK DEFORMATION PROCESSES

9

Hot working and cold working of metals - Forging processes - Open and closed die forging - Characteristics of the process - Rolling of metals - Types of Rolling mills - Flat strip rolling - Shape rolling operations - Defects in rolled parts - Principle of rod and wire drawing.

UNIT IV SHEET METAL FORMING PROCESSES

9

Sheet metal characteristics - Typical shearing operations, bending and drawing operations - Stretch forming operations. Working principle and application of special forming processes - Hydro forming - Rubber pad forming - Metal spinning - Explosive forming - Magnetic pulse forming - Peen forming - Super plastic forming.

UNIT V PROCESSING OF PLASTIC COMPONENTS

9

Types of plastics - Characteristics of the forming and shaping processes - Moulding of Thermoplastics - Working principles and applications of Injection moulding - Plunger and screw machines - Compression moulding - Transfer moulding - Blow moulding - Rotational moulding - Film blowing - Extrusion - Thermoforming - Bonding of Thermoplastics.

TOTAL: 45 PERIODS





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OUTCOMES

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

- Categorize metal casting processes, associated defects, merits and demerits.
- Classify the different metal joining processes.
- Compare various hot working and cold working methods of metals.
- Analyze the various sheet metal making processes.
- Classify the methods of manufacturing plastic components.

TEXT BOOKS

1. Hajra Choudhury S. K, "Elements of Workshop Technology", Vol. II, Media Promoters & Publishers Pvt Ltd., Fifteenth Edition, 2023
2. Kalpakjian. S, "Manufacturing Engineering and Technology", Pearson Education India, Eighth Edition, 2020.

REFERENCES

1. Rao P.N, "Manufacturing Technology - Metal Cutting and Machine Tools", Tata McGraw Hill Publishing Company Pvt Ltd., Fourth Edition, 2020.
2. Roy. A. Lindberg, "Processes and Materials of Manufacture", PHI / Pearson education, Sixth Edition, 2020.

E-RESOURCES

1. http://nptel.ac.in/courses/1121_05126/ - (Manufacturing Technology - Metal Cutting and Machine Tools)
2. <https://freevideolectures/A0dTvfQ8BA/> - (Manufacturing Process)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	1	1	-	-	-	-	-	-	-	3	2
2	3	2	2	1	1	-	-	-	-	-	-	-	3	2
3	3	3	2	1	1	-	-	-	-	-	-	-	3	3
4	3	3	2	2	1	-	-	-	-	-	-	-	3	3
5	3	2	2	1	2	-	-	-	-	-	-	-	3	3
Avg.	3	2.4	2.0	1.2	1.2	-	-	-	-	-	-	-	3	2.6

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


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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, 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	PO12	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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23HST202

TAMILS AND TECHNOLOGY

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





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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. தமிழகவரலாறு - மக்களும்பண்பாடும் - 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 -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.)
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	PO12	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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23HST202

தமிழரும் தொழில்நுட்பமும்
(அனைத்து துறைகளுக்கும் பொதுவானது)

L T P C

1 0 0 1

நோக்கம்

மாணவர்கள்கண்டிப்பாக அறியவேண்டுவன:

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

அலகு 1 நெசவு மற்றும் பாணை தொழில்நுட்பம்

3

சங்ககாலத்தில் நெசவுத் தொழில் - பாணை தொழில்நுட்பம் - கருப்பு, சிவப்பு பாண்டங்கள் - பாண்டுகளில் கீறல் குறியீடுகள்.

அலகு 2 வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்

3

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்ககாலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு - சங்ககாலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச்சிற்பங்கள், கோவில்களும் - சோழர்காலத்து பெருங்கோயில்கள் மற்றும் பிறவழிபாட்டுத்தலங்கள் நாயக்கர்கால கோயில்கள் - மாதிரிகட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக்கட்டிடக்கலை.

அலகு 3 உற்பத்தித் தொழில்நுட்பம்

3

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்பு தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச்சான்றுகளாக செம்பு மற்றும் தங்கநாணயங்கள் - நாணயங்கள் அச்சடிகள் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண்மணிகள் - சங்குமணிகள் - எலும்புதுண்டுகள் - தொல்லியல்சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு 4 வேளாண்மை மற்றும் நீர்ப்பாசன தொழில்நுட்பம்

3

அணை, குளங்கள், மடகு - சோழர்காலகுமுளிதாம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்து குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.





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அலகு 5 அறிவியல் தமிழ் மற்றும் கணித்தமிழ்

3

அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ்நூல்களை மின்பதிப்பு செய்தல் - தமிழ்மென் பொருட்கள் உருவாக்கம் - தமிழ் இணையக்கல்விக்கழகம் - தமிழின்நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத்திட்டம்.

TOTAL: 15 PERIODS

முடிவுகள்

பாடத்தின்முடிவில், மாணவர்கள்அறிந்துகொள்வன:

- பீங்கான்மற்றும்நெசவுதொழில்நுட்பத்தைப்புரிந்துகொள்ளுதல்.
- புதியவடிவமைப்புமற்றும்கட்டுமானதொழில்நுட்பத்தைஉருவாக்குதல்.
- உற்பத்தித்தொழில்நுட்பத்தைஅடையாளம்காணுதல்.
- விவசாயம்மற்றும்நீர்ப்பாசனத்தைப்புரிந்துகொள்ளுதல்.
- அறிவியல்தமிழ்மற்றும்தமிழ்கணிப்பொறிதொடர்பானஅறிவைபெறுதல்.

உரைமற்றும்குறிப்புத்தகங்கள்

1. தமிழகவரலாறு - மக்களும்பண்பாடும் - 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. 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)
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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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Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	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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23HSE201

ENGLISH FOR ENGINEERS: THEORY AND PRACTICE

L T P C

(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 guests - 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 and Résumé.

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





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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" Maven Learning Private Limited,
2. Joshi, Manmohan, Soft Skills, Bookboon, First Edition, 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", Indian ed., New Delhi, Oxford University Press, 2005.

E-RESOURCES

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

EXTENSIVE READING

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

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	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	2	3	-	2	-	-
Avg.	1	2	-	2	1	2	2	1.5	2.33	3	2	1.66	-	-

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

[Signature]
Chairman - BoS





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23GEL201

ENGINEERING PRACTICES LABORATORY

L T P C
0 0 4 2

OBJECTIVES

The main learning objective of this course is to provide hands on training to the students in:

- Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planning; making joints in wood materials used in common household wood work.
- Wiring various electrical joints in common household electrical wire work.
- Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
- Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP - A (CIVIL & ELECTRICAL)

PART I

CIVIL ENGINEERING PRACTICES

15

PLUMBING WORK:

- a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
- b) Preparing plumbing line sketches.
- c) Laying pipe connection to the suction side of a pump
- d) Laying pipe connection to the delivery side of a pump.
- e) Connecting pipes of different materials: Metal, plastic and flexible pipes used inhouse hold appliances.

WOOD WORK:

- a) Sawing,
- b) Planning and
- c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

WOOD WORK STUDY:

- a) Studying joints in door panels and wooden furniture
- b) Studying common industrial trusses using models.





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PART II ELECTRICAL ENGINEERING PRACTICES 15

- Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket
- Staircase wiring
- Fluorescent Lamp wiring with introduction to CFL and LED types.
- Energy meter wiring and related calculations/ calibration
- Study of Iron Box wiring and assembly
- Study of Fan Regulator (Resistor type and Electronic type using Diac / Triac / quadrac)
- Study of emergency lamp wiring/Water heater

GROUP - B (MECHANICAL AND ELECTRONICS)

PART III MECHANICAL ENGINEERING PRACTICES 15

WELDING WORK

- Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.
- Practicing gas welding.

BASIC MACHINING WORK

- (simple) Turning.
- (simple) Drilling.
- (simple) Tapping.

ASSEMBLY WORK

- Assembling a centrifugal pump.
- Assembling a household mixer.
- Assembling an air conditioner.

SHEET METAL WORK

- Making of a square tray

FOUNDRY WORK

- Demonstrating basic foundry operations.

PART IV ELECTRONIC ENGINEERING PRACTICES 15

SOLDERING WORK

- Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK

- Assembling and testing electronic components on a small PCB.





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ELECTRONIC EQUIPMENT STUDY

- Study an elements of smart phone.
- Assembly and dismantle of LED TV.
- Assembly and dismantle of computer/ laptop

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

- Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
- Wire various electrical joints in common household electrical wire work.
- Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.
- Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

Mapping of COs-POS & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	-	-	1	1	1	-	-	-	-	2	-	2
2	3	2	-	-	1	1	1	-	-	-	-	2	-	2
3	3	2	-	-	1	1	1	-	-	-	-	2	-	2
4	3	2	-	-	1	1	1	-	-	-	-	2	-	2
Avg.	3	2	-	-	1	1	1	-	-	-	-	2	-	2

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


Chairman - BoS





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23EEC201

INDIAN LANGUAGE

L T P C

(EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE

0 0 4 2

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

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 (अनेकशब्दोंकेलिए एकशब्द)

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	PO12	PSO1	PSO2
1	-	-	-	-	-	-	-	-	-	3	-	1	-	-
2	-	-	-	-	-	-	-	1	1	3	-	1	-	-
3	-	-	-	-	-	-	-	1	2	3	-	2	-	-
4	-	-	-	-	-	1	1	2	2	3	-	1	-	-
5	-	-	-	-	-	-	-	-	-	2	-	3	-	-
Avg.	-	-	-	-	-	1.0	1.0	1.3	1.6	2.8	-	1.6	-	-

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

P. Sathy
Chairman - BoS





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23EEC201

INDIAN LANGUAGE

L T P C

(EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE

0 0 4 2

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

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





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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	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	-	-	-	3	-	1	1	-	-
2	-	-	-	-	-	-	1	1	3	-	1	1	-	-
3	-	-	-	-	-	1	2	2	3	-	2	2	-	-
4	-	-	-	-	-	-	1	2	3	-	2	2	-	-
5	-	-	-	-	-	1	2	2	3	-	2	2	-	-
Avg.	-	-	-	-	-	1.0	1.5	1.7	3.0	-	1.6	1.6	-	-

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

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23EEC201

INDIAN LANGUAGE

L T P C

(EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE

0 0 4 2

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

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	PO12	PSO1	PSO2
1	-	-	-	-	1	1	1	-	1	2	-	-	-	-
2	-	-	-	-	1	2	2	-	2	2	-	-	-	-
3	-	-	-	-	2	2	2	1	2	3	-	1	-	-
4	-	-	-	-	2	2	2	1	3	3	-	1	-	-
5	-	-	-	-	1	1	1	1	2	3	-	1	-	-
Avg.	-	-	-	-	1.4	1.6	1.6	1.0	0.2	2.6	-	1.0	-	-

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

P. Gaiyya
Chairman - BoS





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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/KE7tQf9spPg>


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23MAT304

SEMESTER III TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

L P T 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.





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OUTCOMES

Upon completion of the course, 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.

TOTAL: 45+15 PERIODS

TEXT BOOKS

1. Grewal B.S, "Higher Engineering Mathematics", Khanna Publishers, Forty 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, Ninth 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	PO12	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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23MET301

ENGINEERING THERMODYNAMICS

L T P C

(Use of Standard Refrigerant Tables and Chart Data Book and Steam Table is Permitted)

3 1 0 4

OBJECTIVES

- To train students in the basic concepts of thermodynamics, thermodynamic systems, processes, and the First Law of Thermodynamics for closed and open systems.
- To teach the Second Law of Thermodynamics, heat engines, refrigerators, heat pumps, and the concept of entropy.
- To develop students' understanding of the properties of pure substances, phase changes, and the use of steam tables and thermodynamic diagrams.
- To explain the behavior of ideal and real gases and the basic thermodynamic relations.
- To develop understanding of psychrometric properties and processes of air - vapour mixtures using psychrometric charts.

UNIT I BASIC CONCEPTS AND FIRST LAW

9+3

Basic concepts - Concept of continuum, comparison of microscopic and macroscopic approach - Thermodynamic systems - Closed, open and isolated - Thermodynamic equilibrium state, path and process - Quasi-static, reversible and irreversible processes - Heat and work transfer, Zeroth law of thermodynamics and First law of thermodynamics - Application to closed and open systems - Steady and unsteady flow processes.

UNIT II SECOND LAW OF THERMODYNAMICS AND CONCEPT OF ENTROPY

9+3

Heat Reservoir, source and sink - Heat Engine, Refrigerator, Heat pump - Second law of thermodynamics - Kelvin - Planck and Clausius statements - Carnot cycle Reversed Carnot cycle, Performance - Clausius inequality - Concept of entropy, entropy change for - Pure substance, ideal gases, principle of increase in entropy. Basic concept of availability.

UNIT III PROPERTIES OF PURE SUBSTANCE

9+3

Properties of pure substance, thermodynamic properties of pure substance in solid, liquid and vapour phases, phase rule, Formation of steam and its thermodynamic properties, p-v, p-T, T-v, T-s, h-s diagrams. p-v-T surface. Use of Steam Table and Mollier Chart. Thermodynamic properties of steam. Calculations of work done and heat transfer in non flow and flow processes. Determination of steam quality.

UNIT IV IDEAL AND REAL GASES, THERMODYNAMIC RELATIONS

9+3

Properties of Ideal gas - Ideal and real gas comparison - Equations of state for ideal and real gases. Compressibility factor and Compressibility chart and its use. Maxwell relations, Tds Equations, Difference and ratio of heat capacities, Energy equation, Joule-Thomson Coefficient, Clausius Clapeyron equation.

UNIT V PSYCHROMETRY

9+3

Psychrometric - Properties, charts. property calculations of air vapour mixtures by using chart and expressions - Psychrometric process - Adiabatic saturation, sensible heating and cooling, humidification, dehumidification, evaporative cooling and adiabatic mixing.

TOTAL: 45+15=60 PERIODS





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OUTCOMES

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

- Apply the basic concepts and apply the First Law of Thermodynamics to thermodynamic systems and processes.
- Examine the Second Law of Thermodynamics and the concept of entropy in heat engines, refrigerators, and heat pumps.
- Apply thermodynamic properties of pure substances using steam tables, thermodynamic diagrams, and Mollier charts in engineering calculations
- Compare the behavior of ideal and real gases using thermodynamic relations and equations of state.
- Analyze the psychrometric properties and processes of air-vapour mixtures using psychrometric charts and equations.

TEXT BOOKS

1. Nag.P.K., "Engineering Thermodynamics", Sixth Edition, Tata McGraw-Hill, 2017.
2. Cengel. Y and M.Boles, "Thermodynamics - An Engineering Approach", Ninth Edition, Tata McGraw Hill, 2019.
3. Rajput.R.K, "A Textbook of Engineering Thermodynamics", Ninth Edition, Laxmi Publications, 2017.

REFERENCES

1. Arora C.P, "Refrigeration and Air Conditioning", Tata McGraw-Hill, Fourth Edition, 2020.
2. Natarajan E., "Engineering Thermodynamics: Fundamentals and Applications", Anuragam publications, 2019.
3. Holman.J.P, "Thermodynamics", McGraw Hill Education, Tenth Edition, 2019.

E-RESOURCES

1. <https://nptel.ac.in/courses/112/105/112105266/> - (Concepts of Thermodynamics)
2. <https://nptel.ac.in/courses/112/104/112104113/> - (Basics of Thermodynamics)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	-	3	-	-	-	-	3	-	2	3	2
2	3	2	2	-	3	-	-	-	-	3	-	2	3	2
3	3	2	2	-	3	-	-	-	-	3	-	2	3	2
4	3	2	2	-	3	-	-	-	-	3	-	2	3	2
5	3	2	2	-	3	-	-	-	-	3	-	2	3	2
Avg.	3	2	2	-	3	-	-	-	-	3	-	2	3	2

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


Chairman - BoS





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TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



23MET302

ENGINEERING MECHANICS

L T P C

(Common to Mechanical Engineering and Robotics and Automaton Engineering)

3 1 0 4

OBJECTIVES

- To train students in the fundamental concepts of mechanics, including scalars, vectors, laws of mechanics, forces, and equilibrium of particles.
- To teach the principles of equilibrium of rigid bodies, moments, couples, and reactions at supports in two and three dimensional systems.
- To develop understanding of friction and its applications in engineering systems such as inclined planes, belts, ladders, and wedges.
- To explain the concepts of centroids and area moments of inertia for simple and composite plane areas.
- To train students in the dynamics of particles, including rectilinear and curvilinear motion, impulse, momentum, and impact of bodies.

UNIT I FUNDAMENTAL CONCEPTS OF MECHANICS

9+3

Introduction to mechanics – Scalars & vectors - Unit conversion – Laws of Mechanics (Parallelogram law, Lami's theorem and Triangular law of forces) – Types of forces acting on a body - Resolution and composition of force – Free body diagram – Equilibrium of a particle - Equivalent system of forces and computation of resultant forces – Principle of transmissibility.

UNIT II EQUILIBRIUM OF RIGID BODIES

9+3

Introduction - Varignon's theorem - Moment of a Force about an Axis, Couple - Moment of a Couple, Equivalent Couples, Resolution of a given Force into a Force - Couple system, Further Reduction of a System of Forces, Equilibrium in Two and Three Dimensions - Reactions at Supports and Connections.

UNIT III FRICTION

9+3

Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction – Angle of Repose – Equilibrium of bodies on inclined plane - Belt friction – Ladder friction – Wedge friction – Rolling resistance.

UNIT IV CENTRIODS AND AREA MOMENT OF INERTIA

9+3

Introduction – Centroids of simple Plane Areas and Curves (rectangle, triangle, circle, hollow circle, T-section & I-section) – Area moment of inertia for rectangle, circle, hollow circle, triangle, I-Section and T-Section - Parallel axis theorem and Perpendicular axis theorem. Principle moments of inertia of plane areas.

UNIT V DYNAMICS OF PARTICLES

9+3

Kinematics - Rectilinear Motion and Curvilinear Motion of particles. Principle of Impulse and Momentum - Impact of elastic bodies.

TOTAL: 45+15=60 PERIODS





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OUTCOMES

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

- Apply the fundamental concepts of mechanics to resolve forces and determine equilibrium of particles.
- Analyze the equilibrium of rigid bodies by calculating moments, couples, and support reactions in two and three dimensions.
- Examine the effects of friction in engineering applications such as inclined planes, belts, ladders, and wedges.
- Calculate the centroids and area moments of inertia for simple and composite plane areas using relevant theorems.
- Analyze the motion of particles using principles of kinematics, impulse, momentum, and impact.

TEXT BOOKS

1. Dr.N.Kottiswaran, "Engineering Mechanics", Sri Balaji Publications, Eleventh Edition, 2018.
2. Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, Sanjeev Sanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education, Twelfth Edition, 2019.
3. Vela Murali, "Engineering Mechanics", Oxford University Press, Second Edition, 2018.

REFERENCES

1. Hibbeler, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", Eleventh Edition, Pearson Education, 2017.
2. Meriam J L and Kraige L G, Engineering Mechanics: Statics and Engineering Mechanics: Dynamics, Ninth Edition, Wiley student edition, 2019.
3. Timoshenko S, Young D H, Rao J V and Sukumar Pati, Engineering Mechanics, Fifth Edition, McGraw Hill Higher Education, 2020.

E-RESOURCES

1. <https://nptel.ac.in/courses/122/104/122104015/> - ((Engineering Mechanics)
2. <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	PO12	PSO1	PSO2
1	3	2	2	-	-	-	-	-	-	-	-	2	-	2
2	3	2	2	-	-	-	-	-	-	-	-	2	-	2
3	3	2	2	-	-	-	-	-	-	-	-	2	-	2
4	3	2	2	-	-	-	-	-	-	-	-	2	-	2
5	3	2	2	-	-	-	-	-	-	-	-	2	-	2
Avg.	3	2	2	-	-	-	-	-	-	-	-	2	-	2

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

Chairman - BoS





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23MEE301

MANUFACTURING TECHNOLOGY

L T P C
3 0 2 4

OBJECTIVES

- To provide knowledge on the principles of metal cutting, chip formation, machining forces, cutting fluids, tool wear, and tool life.
- To introduce the construction, specifications, and operations of lathe and milling machines, including machining time and power estimation.
- To familiarize students with different machine tools and hole making processes such as drilling, reaming, boring, counter boring, counter sinking, and tapping.
- To impart understanding of grinding processes, finishing operations, and gear generation methods used in manufacturing.
- To introduce the fundamentals of CNC machine tools and basic CNC part programming used in modern machining.
- To provide hands-on experience in basic manufacturing processes such as moulding, machining, welding, grinding, and CNC programming.

UNIT I THEORY OF METAL CUTTING

9

Mechanism of chip formation - Orthogonal and Oblique cutting - Machining forces - Merchant's Circle Diagram- Thermal aspects of metal machining - Cutting fluids - machinability - Cutting tool materials - Tool wear - Tool life calculations.

UNIT II LATHE AND MILLING MACHINE

9

Lathe machine - Centre lathe, tool nomenclature, operations, machining time and power estimation - Milling - Specifications - Types - Cutter nomenclature - Operations - Milling processes - Indexing - Gear forming.

UNIT III MACHINE TOOLS AND HOLE MAKING

9

Types, Specification and Quick return Mechanisms: Shaper, Planer and Slotter - Hole making operations - drilling, reaming, boring, counter boring, counter sinking and tapping.

UNIT IV GRINDING AND GEAR GENERATION

9

Grinding - Types of grinding - Grinding wheel designation and selection - Honing, lapping, super finishing, polishing and buffing - Gear generation - Gear shaping and gear hobbing - Specifications - Cutting spur and helical gears.

UNIT V CNC MACHINING

9

Numerical Control (NC) machine tools - CNC types, constructional details, special features, machining centre, part programming fundamentals CNC - Manual part programming - Micromachining - Wafer machining.

LIST OF EXPERIMENTS

1. Mould with solid and split patterns.
2. Mould with loose-piece pattern.
3. Perform facing, plain turning and step turning operations in centre lathe.
4. Perform taper turning, thread cutting and knurling operations in centre lathe.
5. Fabrication of simple structural shapes using arc welding.
6. Spur gear/contour cutting in milling machine.
7. Prepare good surface finish on flat metal.
8. Round to square in shaper.
9. CNC part Programming using CNC lathe and CNC milling machine.
10. Cylindrical grinding

TOTAL: 45+15=60 PERIODS





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OUTCOMES

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

- Apply the principles of metal cutting including chip formation, machining forces, tool wear, and tool life.
- Examine the working and operations of lathe and milling machines for different machining processes and machining time estimation.
- Apply the machine tool operations and hole making processes such as drilling, reaming, boring, and tapping.
- Differentiate the grinding and gear generation processes used in manufacturing applications.
- Construct basic CNC part programs for machining operations.
- Apply basic manufacturing processes such as moulding, machining, welding, grinding, and CNC programming to produce simple components.

TEXT BOOKS

1. Rajput R. K, "Manufacturing Technology", Laxmi Publications (P) Ltd., Third Edition, 2021.
2. Richard R Kibbe, John E Neely, Roland O Merges and Warren T White, "Machine Tool Practices", Prentice Hall of India, Tenth Edition, 2020.
3. Michael Fitzpatrick, Machining and CNC Technology, McGraw-Hill Education; Fourth edition, 2018.

REFERENCES

1. Hajra Choudhury S. K, "Elements of Workshop Technology", Vol. II, Media Promoters & Publishers Pvt Ltd., Fifteenth Edition, 2023
2. Rao P.N, "Manufacturing Technology - Metal Cutting and Machine Tools", Tata McGraw Hill Publishing Company Pvt Ltd., Fourth Edition, 2020
3. A. B. Chattopadhyay, Machining and Machine Tools, Wiley, Second edition, 2017.

E-RESOURCES

1. <http://nptel.ac.in/courses/112105126/> - (Manufacturing Technology-Metal Cutting and Machine Tools)
2. https://freevideolectures/A0dTvF_Q8BA/ - (Manufacturing Process)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	-	2	-	-	-	-	-	-	-	-	3	2
2	3	3	2	2	2	-	-	-	-	-	-	-	3	2
3	3	2	2	2	2	-	-	-	-	-	-	-	3	2
4	3	3	2	2	2	-	-	-	-	-	-	-	3	2
5	3	3	3	2	2	-	-	-	-	-	-	-	3	3
6	3	2	3	2	2	-	-	-	-	-	-	-	3	3
Avg.	3	2.67	2.0	2.0	2.3	-	-	-	-	-	-	-	3.0	2.3

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

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TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



23MEE302

METROLOGY AND MEASUREMENTS

(Lab Embedded Theory Course)

L T P C

3 0 2 4

OBJECTIVES

- To introduce students to the basic concepts of metrology, measurement systems, errors, calibration, limits, fits, and tolerances.
- To provide knowledge on linear and angular measuring instruments such as vernier instruments, micrometers, comparators, and sine bars.
- To familiarize students with advanced metrology techniques including interferometers, coordinate measuring machines, and machine vision systems.
- To impart knowledge on form measurement methods such as straightness, flatness, thread, gear, and surface finish measurement.
- To explain the measurement of mechanical parameters such as force, torque, power, and flow using different measuring instruments.
- Analyze calibration and measurement of dimensional and mechanical parameters using precision measuring instruments.

UNIT I BASICS OF METROLOGY

9

Introduction - Need for measurements - Methods of measurement - Generalized measuring systems - Units and Standards - Types of measuring instruments - Errors in Measurement - Types of errors - Calibration and Interchangeability - Precision and Accuracy - Characteristics of measuring instruments. Limits, Fits and Tolerance.

UNIT II LINEAR AND ANGULAR MEASUREMENTS

9

Linear Measuring Instruments: Vernier Caliper, Vernier Height and Vernier Depth Gauge - Inside, Outside and Depth Micrometer - Slip Gauge - Limit Gauge - Comparator: Mechanical, Pneumatic and Electrical - Angular Measurements: Bevel protractor, Sine bar, Angle Decker, Autocollimator.

UNIT III ADVANCES IN METROLOGY

9

Interferometer: NPL Flatness, Laser and Michelson - Coordinate Measuring Machine - Basic concept, Types, Constructional features, Probes, Accessories - Basic concepts of Machine Vision System - Element - Applications.

UNIT IV FORM MEASUREMENT

9

Principles and Methods of straightness - Flatness measurement - Thread measurement, gear measurement, surface finish measurement, Roundness measurement - Applications

UNIT V MEASUREMENT OF MECHANICAL PARAMETERS

9

Measurement of forces: Direct methods - Equal arm balance and unequal arm balance - Indirect methods - Accelerometers, Load cells, Bourdon tubes. Torque measurement: Strain gauges - Torsion bars. Measurement of Power: Mechanical and DC dynamometers, Eddy current dynamometers. Measurement of flow: Hot wire anemometer, Ultrasonic flow meter.

LIST OF EXPERIMENTS

1. Calibration of precision measuring instruments: Vernier caliper, Micrometer, Vernier height gauge and
2. Calibration of bore gauge and telescopic gauge.
3. Measurement of taper angle using sine bar/sine center and angular dimension measurement using Bevel protractor.
4. Measurement of thickness of gear tooth using gear tooth Vernier.





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5. Comparison of gear/screw parameter using Profile projector/Tool Maker's microscope.
6. Measurement of force
7. Measurement of torque
8. Measurement of temperature.
9. Inspection of specimen using Mechanical/Electrical comparator.
10. Measurement of screw thread parameter using Floating Carriage Micrometer.
11. Measurement of straightness and flatness using two axes Auto Collimator.

TOTAL: 45+15=60 PERIODS

OUTCOMES

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

- Apply the basic principles of metrology and measurement systems, including errors, calibration, limits, fits, and tolerances.
- Examine the working and applications of linear and angular measuring instruments such as vernier instruments, micrometers, comparators, and sine bars.
- Apply advanced metrology techniques such as interferometers, coordinate measuring machines, and machine vision systems for dimensional measurement.
- Compare various form measurement methods such as straightness, flatness, thread, gear, and surface finish measurements.
- Analyze mechanical parameters such as force, torque, power, and flow using appropriate instruments.
- Evaluate metrology experiments to measure, calibrate, and inspect dimensional and mechanical parameters with accuracy and precision.

TEXT BOOKS

1. R.K. Rajput, "A textbook of Measurements and Metrology", Katson Publishers, 2019.
2. Venkateshan, S. P., "Mechanical Measurements", John Wiley & Sons, Fourth Edition, 2020.
3. Jain R.K. "Engineering Metrology", Khanna Publishers, Twenty first Edition, 2020.

REFERENCES

1. Raghavendra, Krishnamurthy "Engineering Metrology & Measurements", Oxford Univ. Press, First Edition, 2020.
2. Gupta, I.C., "Engineering Metrology", Dhanpatrai Publications, Fourth Edition, 2021.
3. Beckwith, Marangoni, Lienhard, "Mechanical Measurements", Pearson Education, 2019.

E-RESOURCES

1. <https://nptel.ac.in/courses/112/104/112104250/> - (Introduction to Measurements and Metrology)
2. <http://www.downloadmela.com/video-lectures/engineering5/mechanicalengineering6/mechanicalmeasurements-and-metrology/> - (Metrology and Measurements)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	1	-	-	2	-	-	-	-	-	-	2	-	2
2	3	1	-	-	2	-	-	-	-	-	-	2	-	2
3	3	1	-	-	2	-	-	-	-	-	-	2	-	2
4	3	1	-	-	2	-	-	-	-	-	-	2	-	2
5	3	1	-	-	2	-	-	-	-	-	-	2	-	2
6	3	1	-	-	2	-	-	2	-	-	-	2	-	2
Avg.	3	1	-	-	2	-	-	2	-	-	-	2	-	2

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

Chairman - Bos





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23CEE402

FLUID MECHANICS AND MACHINERY

(Lab Embedded Theory Course)

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.

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





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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, 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, Seventh Edition, 2019.
2. Modi P.N and Seth S.M, "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House, Sixth Edition, 2019.
3. Rajput R.K, "Fluid Mechanics and Hydraulic Machines", S. Chand Publishing Limited, Third Edition, 2021.

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/> - (Fluid Mechanics)
2. <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	PO12	PSO1	PSO2
1	3	3	2	2	-	2	2	2	-	2	-	2	3	2
2	3	3	2	2	-	2	2	2	-	2	-	2	3	2
3	3	3	2	2	-	2	2	2	-	2	-	2	3	2
4	3	3	2	2	-	2	2	2	-	2	-	2	3	2
5	3	3	2	2	-	2	2	2	-	2	-	2	3	2
6	3	3	2	2	-	2	2	2	-	2	-	2	3	2
Avg.	3	3	2	2	-	2	2	2	-	2	-	2	3	2

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

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





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- 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

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	PO12	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


Chairman - BoS





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TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



SEMESTER IV

23MET401

KINEMATICS OF MACHINERY

L T P C

3 1 0 4

OBJECTIVES

- To introduce the basic concepts of mechanisms, including classification, degree of freedom, Grashof's Law, and mechanical advantage.
- To teach methods for displacement, velocity, and acceleration analysis of linkages using graphical and analytical techniques.
- To explain the principles of cam mechanisms, including follower motions, displacement diagrams, and cam profile layouts.
- To familiarize learners with gears and gear trains, covering tooth profiles, gear terminology, speed ratios, and epicyclic gear systems.
- To present the fundamentals of friction in machine elements, including sliding and rolling friction, friction drives, screw threads, and clutches.

UNIT I BASICS OF MECHANISMS

9 + 3

Classification of mechanisms - Basic kinematic concepts and definitions - Degree of freedom, Mobility - Kutzbach criterion, Gruebler's criterion - Grashof's Law - Kinematic inversions of four-bar chain and slider crank chains - Limit positions - Mechanical advantage - Transmission Angle - Quick return mechanisms

UNIT II LINKAGE MECHANISMS

9 + 3

Displacement, velocity and acceleration analysis of simple mechanisms - Graphical method - Velocity and acceleration polygons - Velocity analysis using instantaneous centres.

UNIT III CAM MECHANISMS

9 + 3

Classification of cams and followers - Terminology and definitions - Displacement diagrams - Uniform velocity, parabolic, simple harmonic and cycloidal motions - Derivatives of follower motions - Layout of plate cam profiles.

UNIT IV GEARS AND GEAR TRAINS

9 + 3

Law of toothed gearing - Involute and cycloidal tooth profiles - Spur Gear terminology and definitions - Gear tooth action - Contact ratio - Interference and undercutting. Gear trains - Speed ratio, train value - Epicyclic Gear Trains

UNIT V FRICTION IN MACHINE ELEMENTS

9 + 3

Surface contacts - Sliding and Rolling friction - Friction drives - Friction in screw threads - Friction clutches

TOTAL :45 +15=60 PERIODS





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OUTCOMES

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

- Apply the principles of kinematics, including how they apply to different types of mechanical systems and machines.
- Analyze displacement, velocity, and acceleration in linkage systems..
- Develop cam profiles and follower motion diagrams for various motions.
- Examine gear systems and gear trains to find speed ratios and check for interference.
- Analyze friction effects in machine elements like clutches, drives, and screw threads

TEXT BOOKS

1. Rattan, S.S, "Theory of Machines", Tata McGraw-Hill, Fifth Edition, 2019.
2. R.S.Khurmi and J.K.Gupta, "Theory of Machines" S.Chand and Co Ltd., Fourteenth Edition, 2022.
3. Ramamurthi. V, "Mechanics of Machines", Narosa Publishing House, Third Edition, 2021.

REFERENCES

1. Cleghorn. W. L, "Mechanisms of Machines", Oxford University Press, Third Edition, 2019.
2. Ghosh. A and Mallick, A.K., "Theory of Mechanisms and Machines", Affiliated East-West Pvt. Ltd., Fifth Edition, 2020.
3. Uicker, J.J., Pennock G.R and Shigley, J.E., "Theory of Machines and Mechanisms", Oxford University Press, Fourth Edition, 2020.

E-RESOURCES

1. <https://nptel.ac.in/courses/112/104/112104121/> - (Kinematics of Machines)
2. <https://nptel.ac.in/courses/112/105/112105268/> - (Kinematics of Mechanism and Machines)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	-	-	-	-	-	-	-	-	2	1	2
2	3	2	2	-	-	-	-	-	-	-	-	2	1	2
3	3	2	2	-	-	-	-	-	-	-	-	2	1	2
4	3	2	2	-	-	-	-	-	-	-	-	2	1	2
5	3	2	2	-	-	-	-	-	-	-	-	2	1	2
Avg.	3	2	2	-	-	-	-	-	-	-	-	2	1	2

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


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23MET402

ENGINEERING MATERIALS AND METALLURGY

L T P C

3 0 0 3

OBJECTIVES

- To introduce alloys, phase diagrams, and types of steels and cast irons with their properties and applications.
- To teach heat treatment processes like annealing, hardening, tempering, and surface treatments.
- To explain ferrous and non-ferrous metals, alloying effects, and their applications.
- To familiarize learners with polymers and ceramics, their properties, and engineering uses.
- To train learners in mechanical properties and testing methods, including hardness, impact, fatigue, and creep.

UNIT I CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS

9

Constitution of alloys - Solid solutions, substitutional and interstitial - Phase diagrams, Isomorphous, eutectic, eutectoid, peritectic, and peritectoid reactions, Iron-carbon equilibrium diagram - Classification of steel and cast Iron microstructure, properties and application.

UNIT II HEAT TREATMENT

9

Definition - Full annealing, stress relief, recrystallisation and spheroidising - Normalising, Hardening and Tempering of steel - Isothermal transformation diagrams - cooling curves superimposed on I.T - Diagram CCR - Hardenability, Jominy end quench test - Austempering, martempering - Case hardening, carburizing, Nitriding, cyaniding, carbonitriding - Flame and Induction hardening.

UNIT III FERROUS AND NON-FERROUS METALS

9

Effect of alloying elements on steel (Mn, Si, Cr, Mo, V, Ti & W stainless and tool steels - HSLA, Maraging steels - Cast Iron - Grey, white, malleable, spheroidal - Alloy cast irons, Copper and copper alloys - Brass, Bronze and Cupronickel - Aluminium and Al-Cu - Precipitation strengthening treatment - Bearing alloys, Mg-alloys, Ni-based super alloys and Titanium alloys.

UNIT IV NON-METALLIC MATERIAL

9

Polymers - Types of polymer, commodity and engineering polymers - Properties and applications of various thermosetting and thermoplastic polymers (PP, PS, PVC, PMMA, PET, PC, PA, ABS, Polymers - Urea and Phenol formaldehydes) - Engineering Ceramics - Properties and applications of Al_2O_3 , SiC, Si_3N_4 , PSZ and Sialon.

UNIT V MECHANICAL PROPERTIES AND TESTING

9

Mechanisms of plastic deformation, slip and twinning - Types of fracture - Testing of materials under tension, compression and shear loads - Hardness tests (Brinell, Vickers and Rockwell), hardness tests, Impact test Izod and charpy, fatigue and creep failure mechanisms.

TOTAL : 45 PERIODS





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OUTCOMES

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

- Analyze the structures of materials and interpret the phase diagrams.
- Analyze the concept of heat treatment of steels and the mechanisms of hardening.
- Examine the fundamental principles behind tailoring material properties of ferrous and non-ferrous metals.
- Compare the properties and applications of non metallic materials.
- Apply suitable testing methods to analyze mechanical properties of materials.

TEXT BOOKS

1. O.P. Khanna, A text book of Materials Science and Metallurgy, Khanna Publishers, Eighth Edition, 2020.
2. Kenneth G.Budinski and Michael K.Budinski "Engineering Materials properties and selection" Pearson India Education Services Pvt Ltd, Ninth edition, 2019.
3. William D.Callister,Jr and David G.Rethwisch " Materials science and Engineering, An introduction" Wiley, Tenth Edition, 2020.

REFERENCES

1. Jindal U.C, "Material Science and Metallurgy", Dorling Kindersley Publication, Third Edition, 2019.
2. Raghavan.V, "Materials Science and Engineering: A First Course", Prentice Hall of India Pvt. Ltd., Seventh Edition, 2019.
3. T.DebRoy, H.K.D.H. Bhadeshia "Innovations in Everyday Engineering Materials" Springer International Publishing, First Edition, 2021.

E-RESOURCES

1. <https://nptel.ac.in/courses/113/102/113102080/> - (Introduction to Material science and Engineering)
2. <https://nptel.ac.in/courses/113/104/113104068/> - (Phase diagram in Material science and Engineering)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	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


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23MEE401

THERMAL ENGINEERING (Lab Embedded Theory Course)

L T P C
3 0 2 4

(Use of Standard Refrigerant Tables and Chart Data Book and Steam Table is Permitted)

OBJECTIVES

- To teach the components, systems, and performance of internal combustion engines, including valve and port timing, fuel injection, and ignition.
- To guide learners in gas power cycles and calculations of efficiency and mean effective pressure.
- To explain the working of steam nozzles, turbines, and governors.
- To familiarize learners with types, working, and efficiencies of air compressors.
- To train learners in refrigeration and air conditioning systems, including vapor compression, absorption cycles, and cooling load calculations.
- To guide students in performing experiments on IC engines, air compressors, and refrigeration systems.

UNIT I INTERNAL COMBUSTION ENGINES

9

IC engines - Classification, Components and their function - Valve timing diagram and port timing diagram - Actual and theoretical p-V diagram of four stroke and two stroke engines and their comparison - Fuel injection system and Ignition system - Battery and Magneto Ignition System - Knocking in SI and CI Engines - Supercharger and Turbocharger - Lubrication and Cooling systems - Performance calculation.

UNIT II GAS POWER CYCLES

9

Air standard efficiency - Mean effective pressure - Otto, Diesel, Dual, Brayton cycles, Calculation of mean effective pressure and air standard efficiency - Comparison of cycles.

UNIT III STEAM NOZZLES AND TURBINES

9

Steam nozzle - Flow of steam through nozzles, shapes of nozzles, effect of friction, critical pressure ratio, supersaturated flow - Impulse and Reaction principles, compounding, velocity diagram for simple turbines, speed regulations - Governors.

UNIT IV AIR COMPRESSOR

9

Classification of air compressors and working principle of various types of compressors - Construction and working of single stage air compressor with and without clearance - Volumetric efficiency - Isothermal efficiency and Isentropic efficiency of reciprocating compressors - Multistage air compressor and inter cooling - Work of multistage air compressor.

UNIT V REFRIGERATION AND AIR CONDITIONING

9

Refrigerants - Vapour compression refrigeration cycle - Performance calculations - Super heat, sub cooling - Working principle of vapour absorption system, Ammonia - Water, Lithium bromide - Water systems (Description only) - Air conditioning system - Processes - Types and Working Principles - Simple Cooling Load calculations.

LIST OF EXPERIMENTS

1. Valve Timing diagrams.
2. Port Timing diagrams.
3. Performance Test on 4 - stroke Diesel Engine.
4. Heat Balance Test on 4 - stroke Diesel Engine
5. Morse Test on Multi-cylinder Petrol Engine.
6. Retardation Test on a Diesel Engine.
7. Determination of Flash Point and Fire Point of various fuels / lubricants.

TOTAL: 45+15=60 PERIODS





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OUTCOMES

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

- Analyze the components, working, and performance of internal combustion engines, including SI and CI engines, ignition, fuel systems, and cooling/lubrication systems.
- Compare the performance of gas power cycles such as Otto, Diesel, Dual, and Brayton cycles, including air standard efficiency and mean effective pressure.
- Examine the flow of steam through nozzles and turbines, and analyze impulse and reaction principles, compounding, velocity diagrams, and speed regulation.
- Analyze the operation and performance of air compressors, including single-stage and multistage compressors, volumetric efficiency, and isentropic/isothermal efficiency.
- Analyze the performance of refrigeration and air conditioning systems, including vapour compression and absorption cycles, superheating, sub-cooling, and cooling load calculations.
- Conduct performance tests on petrol engines, diesel engines, and compressors, and apply standard methods for evaluation.

TEXT BOOKS

- Kothandaraman.C.P, Domkundwar.S, Domkundwar.A.V., "A course in thermal Engineering" Dhanpat Rai & sons, Sixth Edition, 2020.
- Rajput. R. K., "Thermal Engineering" S.Chand Publishers, Eighth Edition, 2019.
- Michael A. Boles, Yunus A. Cengel, "Thermodynamics: An Engineering Approach", Tata McGraw - Hill Education, Eighth Edition, 2021.

REFERENCES

- Arora.C.P, "Refrigeration and Air Conditioning", Tata McGraw-Hill Publishers, Fifth Edition, 2021.
- Ganesan.V "Internal Combustion Engines", Tata McGraw-Hill, Third Edition, 2019.
- Manohar Prasad, "Refrigeration and Air Conditioning", New Age International publications, Third Edition, 2021.

E-RESOURCES

- <https://nptel.ac.in/courses/112/103/112103262/> - (Engine and Gas Turbines)
- <https://nptel.ac.in/courses/112/103/112103275/> - (Applied Thermodynamics for Engineers)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	-	-	1	1	-	2	-	-	3	2	2
2	3	3	2	-	-	1	1	-	2	-	-	3	2	2
3	3	3	2	-	-	1	1	-	2	-	-	3	2	2
4	3	3	2	-	-	1	1	-	2	-	-	3	2	2
5	3	3	2	-	-	1	1	-	2	-	-	3	2	2
6	3	3	2	-	-	1	1	-	2	-	-	3	2	2
Avg.	3	3	2	-	-	1	1	-	2	-	-	3	2	2

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


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23MEE402

STRENGTH OF MATERIALS

(Lab Embedded Theory Course)

(Common to Mechanical and Robotics and Automation)

L T P C

3 0 2 4

OBJECTIVES

- To teach different types of stresses and strains, axial and thermal effects, elastic constants, and factor of safety in solids.
- To explain principal stresses, stresses on inclined planes, Mohr's circle, and stresses in thin and thick-walled cylinders.
- To familiarize learners with bending and shear stress distribution, load carrying capacity, and proportioning of beam sections.
- To guide learners in evaluating beam deflections and column strength using standard methods and formulas.
- To teach torsion in shafts, stresses in helical and carriage springs, and related practical examples
- To guide students in performing experiments and demonstrate practical measurements of stress, strain, hardness, deflection, torsion, and heat treatment effects.

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS

9

Stresses types - Tension, Compression and Shear Stresses - Hooke's law - Stresses and strains due to axial force in stepped and composite bars - Stresses due to thermal effect in composite bars - Factor of safety - Poisson ratio - Elastic constants and their relationship.

UNIT II STRESSES IN TWO DIMENSIONS

9

Stresses on inclined planes - Principal planes and Principal stresses - Mohr's circle for bi-axial stress with shear stress - Analytical and Graphical methods. Hoop and longitudinal stresses in thin and thick cylindrical vessels, Maximum Shear stress, Changes in dimensions and volume.

UNIT III TRANSVERSE LOADING ON BEAMS AND STRESSES IN BEAMS

9

Types of supports, Loads and beams - Shear force and bending Moment in cantilever, simply supported and overhanging beams. Theory of simple bending - Bending stress distribution - Load carrying capacity - Proportioning of sections - Shear stress distribution.

UNIT IV DEFLECTION OF BEAMS AND COLUMNS

9

Evaluation of slope and deflection of cantilever and simply supported beams - Double integration method - Macaulay's method. Types of Columns, Equivalent length, Euler and Rankine formulae, Slenderness ratio.

UNIT V TORSION IN SHAFT AND HELICAL SPRING

9

Torsion of circular solid and hollow shafts - Shear strength - Angle of twist and torsional stiffness - Stresses in helical springs - Deflection of helical springs, carriage springs.

LIST OF EXPERIMENTS

- Tension test on steel rod in U.T.M.
- Torsion test on steel rod.
- Impact test on metal specimen.
- Hardness test on metals - Brinell and Rockwell Hardness.
- Deflection test on beams.
- Spring Test - Open coil and Closed coil.
- Effect of Hardening - improvement of hardness and impact resistance of steels
- Tempering- Improvement Mechanical properties Comparison
 - Unhardened specimen
 - Quenched Specimen and
 - Quenched and tempered specimen.





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9. Double shear test on metal
10. Microscopic Examination of
 - (i) Hardened samples and
 - (ii) Hardened and tempered samples.

TOTAL: 45+15=60 PERIODS

OUTCOMES

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

- Examine how variations in material properties and structure configurations affect the overall stress and strain responses.
- Analyze the importance of two dimensional stress systems and stresses in thin and thick cylinders.
- Draw the shear force and bending moment diagrams for beams subjected to various loading conditions, such as point loads, distributed loads, and moments.
- Apply the impact of estimated slopes and deflections on the overall design and safety of structural components.
- Apply torsion equation in design of circular shafts and helical springs.
- Examine how the results from different tests compare and what they reveal about the specimen's overall mechanical behavior.

TEXT BOOKS

1. Bansal, R.K., "Strength of Materials", Laxmi Publications (P) Ltd., New Delhi, Sixth Edition, 2021
2. Rajput R K., "A Textbook of Strength of Materials (Mechanics of Solids)", S Chand and Company Ltd., Fourth Edition, 2020.
3. F.P. Beer and R.Johnston, "Mechanics of Materials", McGraw Hill Education India (P) Ltd., Seventh Edition, 2023.

REFERENCES

1. Subramanian R., "Strength of Materials", Oxford University Press, Oxford Higher Education Series, Second Edition, 2021.
2. Egor P Popov, "Engineering Mechanics of Solids", Prentice Hall of India, Fourth Edition, 2023.
3. Rattan.S.S, "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., Fourth Edition, 2023.

E-RESOURCES

1. <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)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	1	-	-	1	1	-	-	-	-	3	2	2
2	3	3	1	-	-	1	1	-	-	-	-	3	2	2
3	3	3	1	-	-	1	1	-	-	-	-	3	2	2
4	3	3	1	-	-	1	1	-	-	-	-	3	2	2
5	3	3	1	-	-	1	1	-	-	-	-	3	2	2
6	3	3	1	-	-	1	1	-	2	-	-	3	2	2
Avg.	3	3	1	-	-	1	1	-	2	-	-	3	2	2

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

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23GEE301

PROBLEM SOLVING AND PYTHON PROGRAMMING

L T P C

(Lab Embedded Theory Course)

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 blocksof algorithms(statements,state,controlflow,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.





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Coding practices:

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

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





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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 – density and contour plots – 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

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. Implementation of 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. Implementation of real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc. - operations of Sets & Dictionaries)
6. Implementation of programs using Functions. (Factorial, largest number in a list, area of shape)
7. Implementation of programs using Strings. (reverse, palindrome, character count, replacing characters)
8. Implementation of programs using written modules and Python Standard Libraries (p and as, numpy, Matplotlib, scipy)
9. Implementation of real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
10. Implementation of real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark range validation)

TOTAL : 45 +15 = 60 PERIODS





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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.

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	PO12	PSO1	PSO2
1	3	3	2	1	2	-	-	-	-	-	-	2	-	-
2	3	2	2	-	3	-	-	-	-	-	-	2	-	-
3	3	3	2	1	3	-	-	-	-	-	-	2	-	-
4	3	2	2	-	3	-	-	-	-	-	-	2	-	-
5	2	3	2	2	3	-	-	-	-	1	-	2	-	-
6	3	3	3	2	3	-	-	1	1	2	1	2	-	-
Avg.	2.83	2.667	2.16	1.5	2.83	-	-	1	1	1.5	1	2	-	-

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

(Signature)
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


Chairman - BoS





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DEPARTMENT OF MECHANICAL ENGINEERING

REGULATION - 2023

(III - IV SEMESTERS)

MINOR DEGREE / HONOURS INDUSTRIAL SAFETY ENGINEERING CURRICULUM AND SYLLABI





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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	12	1	2
II	III	23MEIT01- Safety Management	3	1	1	-	-	-	-	-	-	-	-	1	2	2
II	IV	23MEIT02 - Industrial Safety, Health and Environment (SHE) Acts	3	-	2	-	-	2	2	-	-	-	-	1	-	2





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CURRICULUM AND SYLLABI

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

(MINOR DEGREE / HONOURS - INDUSTRIAL SAFETY ENGINEERING)

B.E - MECHANICAL ENGINEERING

B.E - MECHANICAL ENGINEERING										
Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks			
			L	T	P		C	CIA	ESE	TOT
THEORY										
23MEIT01	Safety Management	PC	3	0	0	3	40	60	100	
23MEIT02	Industrial Safety, Health and Environment (SHE) Acts	PC	3	0	0	3	40	60	100	
23MEIT03	Fire Engineering and Explosion Control	PC	3	0	0	3	40	60	100	
EMBEDDED COURSE										
23MEIE01	Safety in Engineering Industry	PC	3	0	2	4	50	50	100	
EMPLOYABILITY ENHANCEMENT COURSE										
23MEIP01	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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SEMESTER III

23MEIT01

SAFETY MANAGEMENT

L T P C
3 0 0 3

OBJECTIVES

- To introduce the basic concepts of safety management and safety regulations in industries.
- To teach students different safety techniques such as inspection, survey, sampling, and safety audit.
- To help students understand accident causes, investigation methods, and reporting procedures.
- To develop knowledge in monitoring safety performance using safety indicators.
- To create awareness about safety education, training, and the importance of a safety culture in workplaces.

UNIT I CONCEPTS AND TECHNIQUES

9

Content Evolution of modern safety concept - Safety Management functions - planning for safety for optimization of productivity - productivity, quality and safety - line and staff functions for safety - safety committee - budgeting for safety - safety policy - Statutory Provisions for safety management. Incident Recall Technique (IRT), safety survey, safety inspection, safety sampling, Safety Audit.

UNIT II SAFETY AUDIT

9

Components of safety audit, types of audit, audit methodology, non conformity reporting (NCR), audit checklist and report - review of inspection, remarks by government agencies, consultants, experts - perusal of accident and safety records, formats - implementation of audit indication - identification of unsafe acts of workers and unsafe conditions in the shop floor

UNIT III ACCIDENT INVESTIGATION AND REPORTING

9

Basic Principle of Accident & Prevention concept of an accident, reportable and non reportable accidents, reporting to statutory authorities - principles of accident prevention - accident investigation and reporting - Accident analysis - based on causes & injury - records for accidents, departmental accident reports, documentation of accidents - unsafe act and condition - Accident causation theories - domino sequence - supervisory role - role of safety committee - cost of accident

UNIT IV SAFETY PERFORMANCE MONITORING

9

Reactive and proactive monitoring techniques, frequency severity incidence, incident rate, accident rate, safety "t" score, safety activity rate) Recommended practices for compiling and measuring work injury experience - permanent total disabilities, permanent partial disabilities - accident data analysis.

UNIT V SAFETY EDUCATION AND TRAINING

9

Importance of training - identification of training needs - training methods such as hands on training and tabletop exercise - Programme, seminars, conferences, competitions - method of promoting safe practice - motivation - communication - safety attitude and culture - role of government agencies and private consulting agencies in safety training - creating awareness, awards, celebrations, safety posters, safety displays, safety pledge, safety incentive scheme, safety campaign - Domestic Safety and Training.

TOTAL: 45 PERIODS





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OUTCOMES

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

- Classify the modern safety concepts, safety management functions, and statutory safety provisions used in industries.
- Examine the procedures and components of safety audits to identify unsafe acts and unsafe conditions in the workplace.
- Analyze and compare accident causes using accident investigation methods and accident causation theories.
- Analyze safety performance indicators such as accident rate, incident rate, and safety "T" score.
- Categorize safety training methods and safety promotion activities used to develop a positive safety culture.

TEXT BOOKS

1. Philip R. Harris., "Industrial Safety and Health for Small Businesses", Prentice Hall Inc, Third Edition, 2020.
2. National Safety Council, "Accident Prevention Manual for Business & Industry: Engineering & Technology", Fifteenth Edition, 2022.
3. C. Ray Asfahl, David W. Rieske, "Industrial Safety and Health Management", Pearson, Seventh Edition, 2019

REFERENCES

1. Charles D. Reese, "Occupational Health and Safety Management: A Practical Approach", CRC Press, Third Edition, 2021.
2. Frank Crawley, Ian Sutton, "Loss Prevention in the Process Industries: Volume 1 - Fundamental Principles and Methods", Elsevier, Third Edition, 2022.
3. Gupta, R.S., "Handbook of Safety Management: A Practical Approach" CRC Press, Second Edition, 2020.

E-RESOURCES

1. <https://www.youtube.com/watch?v=M0ftV9nPJY> – (Theories of accident causation)
2. [https://www.safetyproresources.com/blog/9-steps-for_accident-investigations-\(OSHA-inspection-process\)](https://www.safetyproresources.com/blog/9-steps-for_accident-investigations-(OSHA-inspection-process))

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	1	1	-	-	-	-	-	-	-	-	1	2	2
2	3	1	1	-	-	-	-	-	-	-	-	1	2	2
3	3	1	1	-	-	-	-	-	-	-	-	1	2	2
4	3	1	1	-	-	-	-	-	-	-	-	1	2	2
5	3	1	1	-	-	-	-	-	-	-	-	1	2	2
Avg.	3	1	1	-	-	-	-	-	-	-	-	1	2	2

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

Chairman - BoS





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SEMESTER IV

23MEIT02 INDUSTRIAL SAFETY, HEALTH AND ENVIRONMENT (SHE) ACTS

L T P C

3 0 0 3

OBJECTIVES

- To introduce students to the important provisions of the Factories Act 1948 and Tamil Nadu Factories Rules related to industrial health, safety, and welfare.
- To provide knowledge about environmental protection laws and rules for controlling pollution and ensuring environmental safety.
- To explain the regulations related to the manufacture, storage, and handling of hazardous chemicals in industries.
- To familiarize students with various national industrial safety acts and rules applicable to different sectors.
- To create awareness about international occupational health and safety acts and standards used for improving workplace safety.

UNIT I FACTORIES ACT - 1948

9

Statutory authorities - inspecting staff, health, safety, provisions relating to hazardous processes, welfare, working hours, employment of young person's - special provisions - penalties and procedures - Tamilnadu Factories Rules 1950 under Safety and health chapters of Factories Act 1948, forms, registers and notices - Amendments.

UNIT II ENVIRONMENT ACT - 1986

9

General powers of the central government, prevention, control and abatement of environmental pollution - Biomedical waste (Management and Handling) Rules, 1989 - The Noise Pollution (Regulation and control) Rules, 2000 - The Batteries (Management and Handling) Rules, 2001 - No Objection certificate from statutory authorities like pollution control board.

UNIT III MANUFACTURE, STORAGE AND IMPORT OF CHEMICAL RULES 1989

9

Definitions - duties of authorities - responsibilities of occupier - notification of major accidents - information to be furnished - preparation of offsite and onsite plans - list of hazardous and toxic chemicals - safety reports - safety data sheets.

UNIT IV OTHER ACTS AND RULES

9

Indian Boiler Act 1923, Static and Mobile Pressure Vessel Rules (SMPV), Motor Vehicle Rules, Mines Act 1952, Workman Compensation Act, Rules - Electricity Act and Rules - Hazardous Wastes (Management and Handling) Rules, 1989, with amendments in 2000 - The Building and Other Construction Workers Act 1996., Petroleum rules, Gas cylinder rules - Explosives Act 1983 - Pesticides Act.

UNIT V INTERNATIONAL ACTS AND STANDARDS

9

Occupational Safety and Health Act of USA (The Williams - Steiger Act of 1970) - Health and Safety Work Act (HASAWA) 1974, UK - SHAS 18001 - ISO 45001 - American National Standards Institute (ANSI).

TOTAL : 45 PERIODS





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OUTCOMES

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

- Classify the important provisions of the Factories Act 1948 and Tamil Nadu Factories Rules related to health, safety, and welfare.
- Examine the main provisions of the Environment Act 1986 and environmental protection rules.
- Categorize the duties and responsibilities under the Manufacture, Storage and Import of Hazardous Chemical Rules 1989.
- Compare different industrial safety acts such as the Boiler Act, Mines Act, and Electricity Act.
- Analyze international safety standards and acts used for occupational health and safety.

TEXT BOOKS

1. The Factories Act 1948, Madras Book Agency, Chennai, Second Edition, 2015.
2. The Environment Act (Protection) 1986, Commercial Law Publishers (India) Pvt. Ltd., Second Edition, 2019.
3. Danuta Koradecka, "Handbook of Occupational Health and Safety", CRC, 2015.

REFERENCES

1. The Indian boilers act 1923, Commercial Law Publishers (India) Pvt. Ltd., Allahabad, Second Edition, 2016.
2. The Mines Act 1952, Commercial Law Publishers (India) Pvt. Ltd., Allahabad, Second Edition, 2019.
3. S.P. Mahajan, "Pollution control in process industries", Tata McGraw Hill Publishing Company, 2015.

E-RESOURCES

1. <https://nptel.ac.in/courses/120108004> - (Environment Management)
2. <https://www.youtube.com/watch?v=9QM-3LMeBQA> - (Factories Act)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	-	2	-	-	2	2	-	-	-	-	1	-	2
2	3	-	2	-	-	2	2	-	-	-	-	1	-	2
3	3	-	2	-	-	2	2	-	-	-	-	1	-	2
4	3	-	2	-	-	2	2	-	-	-	-	1	-	2
5	3	-	2	-	-	2	2	-	-	-	-	1	-	2
Avg.	3	-	2	-	-	2	2	-	-	-	-	1	-	2

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


Chairman - BoS





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DEPARTMENT OF MECHANICAL ENGINEERING

REGULATION - 2023

(III - IV SEMESTERS)

MINOR DEGREE/ HONOURS

3D PRINTING

CURRICULUM AND SYLLABI





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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	12	1	2
II	III	23METT01 - 3D Printing Machines and Systems	3	2	2	-	-	-	-	-	-	-	-	-	2	2
II	IV	23METT02 - Rapid Tooling and Industrial Applications	2	3	2	-	-	-	-	-	-	-	-	-	2	2





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CURRICULUM AND SYLLABI FOR B.E. / B.Tech. DEGREE PROGRAMMES (MINOR DEGREE / HONOURS - 3D PRINTING)

B.E- MECHANICAL ENGINEERING

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks			
			L	T	P		C	CIA	ESE	TOT
THEORY										
23METT01	3D Printing Machines and Systems	PC	3	0	0	3	40	60	100	
23METT02	Rapid Tooling and Industrial Applications	PC	3	0	0	3	40	60	100	
23METT03	Print Operations Management	PC	3	0	0	3	40	60	100	
EMBEDDED COURSE										
23METE01	3D Printing Design Process	PC	3	0	2	4	50	50	100	
EMPLOYABILITY ENHANCEMENT COURSE										
23METP01	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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SEMESTER III

23METT01

3D PRINTING MACHINES AND SYSTEMS

LT P C

3 0 0 3

OBJECTIVES

- To introduce students to the fundamentals and evolution of 3D printing and rapid prototyping processes.
- To provide knowledge of various rapid prototyping systems and their working principles.
- To familiarize students with the technical capabilities and practical applications of rapid prototyping technology in engineering and manufacturing.
- To explain indirect and direct methods for rapid tool production using different materials and processes.
- To develop understanding of rapid tooling process optimization, error minimization, and part orientation strategies for accurate prototype production.

UNIT I INTRODUCTION TO 3D PRINTING MACHINES & PROCESSES

9

Introduction to 3D Printing Machines: Historical Perspectives, Rapid Prototyping - An Integral Part of TimeCompression Engineering, RP Information Workflow.

Rapid Prototyping Processes: Classification of Rapid Prototyping Processes, Processes Involving a Liquid - Solidification of a Liquid Polymer

UNIT II RAPID PROTOTYPING SYSTEMS

9

Stereolithography Apparatus, Solid Ground Curing Systems, Fused Deposition Modelling Systems, Selective Laser Sintering Systems, Laminated Object Manufacturing Systems, Paper Lamination Technology

UNIT III TECHNICAL, TECHNOLOGICAL CAPABILITIES & APPLICATIONS OF RAPID PROTOTYPING TECHNOLOGY

9

Technical Characteristics and Technological Capabilities of Concept: Modellers, 3D Systems Thermo Jet Printer, Sanders Model Maker II, Stratasys Genisys Xs 3D Printer, JP System, Applications of Rapid Prototyping Technology: Functional Models, Pattern for Investment and Vacuum Casting, Art Models, Engineering Analysis Models.

UNIT IV INDIRECT & DIRECT METHODS FOR RAPID TOOL PRODUCTION

9

Indirect Methods for Rapid Tool Production: Role of Indirect Methods in Tool Production, Metal Deposition Tools, Epoxy Tools, Ceramic Tools, Cast Metal Tools, Investment Casting, Fusible Metallic Core, Sand Casting Process.

Direct Methods for Rapid Tool Production: Classification of Direct Rapid Tool Methods, Direct ACESTM Injection Molds, DTM RapidTool1 Process, Sand Form EOS Direct tool Process, Topographic Shape Formation.

UNIT V APPLICATIONS OF RAPID TOOLING TECHNOLOGY & PROCESS OPTIMISATION

9

RPT Optimization - Factors Influencing Accuracy - Data Preparation, Errors due to Tessellation and Slicing, Part Building, Part Building Errors in the SL Process and SLS Process, Part Finishing, Selection of Part Build Orientation, Orientation Constraints of the SL and SLS Process.

TOTAL: 45 PERIODS





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OUTCOMES

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

- Classify 3D printing machines and rapid prototyping processes based on their working principles and applications.
- Compare different rapid prototyping systems such as SLA, FDM, SLS, and laminated object manufacturing for technical suitability.
- Categorize applications of rapid prototyping technology into functional models, investment patterns, art models, and engineering analysis models.
- Examine indirect and direct rapid tooling methods to select the appropriate technique for tool production.
- Analyze factors influencing rapid tooling accuracy, process errors, and part orientation to optimize prototype and tool quality.

TEXT BOOKS

1. D.T. Pham, S.S. Dimov, "Rapid Manufacturing: The Technologies and Applications of Rapid Prototyping and Rapid Tooling", Springer Science & Business Media, Second Edition, 2018.
2. Clifford T Smyth, "Functional Design for 3D Printing Machines", Third Edition, 2017.
3. Rafiq Noorani, "3D Printing Technology, Applications, and Selection", Fourth Edition 2019.

REFERENCES

1. Andreas Gebhardt, "Understanding Additive Manufacturing: Rapid Prototyping, Rapid Tooling, Rapid Manufacturing", Third Edition, 2018.
2. Peter Hilton & Paul Jacobs, "Rapid Tooling: Technologies and Industrial Applications", Second Edition, 2017.
3. Paul F. Jacobs, "Rapid Tooling: Technologies and Industrial Applications", Third Edition, 2019.

E-RESOURCES

1. <https://nptel.ac.in/courses/116102052> - (Advanced Textile printing technology)
2. <https://nptel.ac.in/courses/116102053> - (3 D Printing machine)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	-	-	-	-	-	-	-	-	-	2	2
2	3	2	2	-	-	-	-	-	-	-	-	-	2	2
3	3	2	2	-	-	-	-	-	-	-	-	-	2	2
4	3	2	2	-	-	-	-	-	-	-	-	-	2	2
5	3	2	2	-	-	-	-	-	-	-	-	-	2	2
Avg.	3	2	2	-	-	-	-	-	-	-	-	-	2	2

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


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SEMESTER IV

23METT02

RAPID TOOLING AND INDUSTRIAL APPLICATIONS

LT P C

3 0 0 3

OBJECTIVES

- To introduce students to the fundamentals of Additive Manufacturing (AM), layer-based technology, and machine classifications.
- To provide knowledge of various layer manufacturing processes including polymerization, sintering, melting, extrusion, and binder-based 3D printing.
- To familiarize students with industrial applications of AM in automotive, aerospace, consumer goods, medical, and mold-making sectors.
- To explain design strategies in AM, including complex geometries, multi-material parts, and customization approaches.
- To develop understanding of materials, engineering design rules, tolerances, and quality management aspects for additive manufacturing.

UNIT I BASICS, DEFINITIONS, AND APPLICATION LEVELS

9

Additive Manufacturing - Layer Manufacturing, Principle of layer-based technology, Application Levels, Indirect processes, Classes of machines for additive manufacturing.

UNIT II LAYER MANUFACTURING PROCESSES

9

Direct Layer Manufacturing Processes, Polymerization - Laser-Stereolithography, Polymer Printing and Jetting, Digital Light Processing, Micro Stereolithography. Sintering and Melting - Laser Sintering - Laser Melting - Selective Laser Melting (SLM), Electron Beam Melting. Extrusion - Fused Layer Modeling, Powder - Binder Bonding - Three-Dimensional Printing - Z-Corporation, Prometal - LLM

UNIT III APPLICATIONS OF RAPID PROTOTYPE TOOLING

9

Data Processing and Application Workflow - AM Process Chain, Applications of AM - Automotive Industries and Suppliers. Aerospace Industry, Consumer Goods, Toy Industry, Art and History of Art, Foundry and Casting Technology, Mold and Die Making for Plastic Injection Molding and Metal Die Casting, Medical, Architecture and Landscaping.

UNIT IV ADDITIVE MANUFACTURING DESIGN AND STRATEGIES

9

Potential of AM, Potentials and Resulting Perspectives - Complex Geometries, Integrated Geometry, Integrated Functionalities, Multi-Material Parts and Graded Materials. AM-Based New Strategies - Customization.

UNIT V MATERIALS, DESIGN, AND QUALITY ASPECTS FOR ADDITIVE MANUFACTURING

9

Materials for AM - Anisotropic and Isotropic properties material, Graded and Composite Materials. Engineering Design Rules for AM - Tolerances - Digital to Object, Relative Fit, Flexures, Hinges, and Snap-Fits, Orientation and Clamping, Drillings (Bores), Gaps, Pins, and Walls. AM Properties, Selection, Build Management

TOTAL: 45 PERIODS





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OUTCOMES

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

- Classify additive manufacturing processes and machine types based on their operating principles.
- Compare different layer manufacturing techniques such as polymerization, sintering, melting, and extrusion for various applications.
- Categorize industrial applications of AM across automotive, aerospace, consumer goods, medical, and tooling industries.
- Examine design strategies in AM for complex geometries, multi-material parts, and functional integration.
- Analyze material properties, design rules, and quality factors to optimize additive manufacturing processes.

TEXT BOOKS

1. Andreas Gebhardt, "Understanding Additive Manufacture: Rapid Prototyping, Rapid Tooling and Rapid Manufacture", Third Edition, 2018.
2. Kaushik Kumar, Divya Jindani, "Rapid prototyping and tooling", Second Edition, 2020.
3. Ali K. Kamrani, Emad Abouel Nasr, "Rapid Prototyping : Theory and Practice", Second Edition, 2020.

REFERENCES

1. Chee Kai Chua, Kah Fai Leong, Chu Sing Lim, "Rapid Prototyping: Principles and Applications", Second Edition, 2018.
2. D.T. Pham and S.S. Dimov, Rapid Manufacturing: The Technologies and Applications of RapidPrototyping & Rapid Tooling, Springer, 2019.
3. Wanlong Wang, Henry W. Stoll and James G. Conley, Rapid Tooling Guidelines for SandCasting, Springer, 2017.

E-RESOURCES

1. <https://nptel.ac.in/courses/112104265> - (Rapid Manufacturing)
2. <https://archive.nptel.ac.in/courses/112/104/112104265/> - (Rapid Manufacturing process)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	2	-	-	-	-	-	-	-	-	-	2	2
2	2	3	2	-	-	-	-	-	-	-	-	-	2	2
3	2	3	2	-	-	-	-	-	-	-	-	-	2	2
4	2	3	2	-	-	-	-	-	-	-	-	-	2	2
5	2	3	2	-	-	-	-	-	-	-	-	-	2	2
Avg .	2	3	2	-	-	-	-	-	-	-	-	-	2	2

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


Chairman - BoS





SENGUNTHAR ENGINEERING COLLEGE (AUTONOMOUS)

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TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



CREDIT SUMMARY

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

(MINOR DEGREE / HONOURS - INDUSTRIAL SAFETY ENGINEERING / 3D PRINTING)

B.E. MECHANICAL ENGINEERING

Category	Credits Per Semester								Credit Total
	I	II	III	IV	V	VI	VII	VIII	
HS	-	-	-	-	-	-	-	-	-
BS	-	-	-	-	-	-	-	-	-
ES	-	-	-	-	-	-	-	-	-
PC	-	-	3	3	3	4	-	-	13
PE	-	-	-	-	-	-	-	-	-
OE	-	-	-	-	-	-	-	-	-
EEC	-	-	-	-	-	-	6	-	6
MC	-	-	-	-	-	-	-	-	-
Total	-	-	3	3	3	4	6	-	19

