



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



CURRICULAM & SYLLABI

B.Tech. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

(CHOICE BASED CREDIT SYSTEM)

REGULATIONS - 2023

(For the students admitted in the academic year 2023 – 2024 onwards)



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





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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

REGULATION 2023

CURRICULUM AND SYLLABI

FOR B. Tech. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

(For the students admitted in the academic year 2023 – 2024 onwards)

FIRST SEMESTER
TO
EIGHTH SEMESTER





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SCHEME FOR CURRICULUM

B.Tech.-Artificial Intelligence and Data Science





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REGULATIONS 2023

CHOICE BASED CREDIT SYSTEM

B. Tech. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

VISION

- To achieve excellence in the field of Artificial Intelligence by focusing knowledge-centric education, innovation and cutting-edge research to address the needs of industry and society.

MISSION

- Impart knowledge in Artificial Intelligence and data Science technologies with innovative thoughts and leadership skills with industry support.
- Educating the students by enhancing knowledge in the Artificial Intelligence domain.
- Strengthening the students to competence in Artificial Intelligence and Data Science through research and innovative activities.
- Enabling the students professional growth through training and self-learning.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates can

- ✓ Utilize their proficiencies in the fundamental knowledge of basic sciences, mathematics, Artificial Intelligence, data science and statistics to build systems that require management and analysis of large volumes of data.
- ✓ Advance their technical skills to pursue pioneering research in the field of Artificial Intelligence and Data Science and create disruptive and sustainable solutions for the welfare of ecosystems.
- ✓ Think logically, pursue lifelong learning and collaborate with an ethical attitude in a multidisciplinary team.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
PO2	Problem analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design / development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.





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PO4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
PO6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOME (PSOs)

PSO1	Evolve AI based efficient domain specific processes for effective decision making in several domains such as business and governance domains.
PSO2	Arrive at actionable Foresight, Insight, hindsight from data for solving business and engineering problems.
PSO3	Create, Select and apply the Theoretical Knowledge of AI and Data Analytics along with practical industrial tools and techniques to manage and solve wicked societal problems.





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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	3	
I	I	23HST101 - Professional English - I	-	-	-	-	-	1.4	2.2	1.25	1.8	3	-	3	-	-	-	
		23MAT101 - Matrices and calculus	3	3	2	-	-	-	-	-	-	-	1	2	-	-	-	
		23HST102 - தமிழர்மரபு/Heritage of Tamils	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		23PHE102 - Applied Physics for Computer Engineering	3	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-
		23CYE101 - Engineering Chemistry	1.6	1.6	2.4	1.25	1.8	1	2	-	-	-	-	-	1.5	-	-	-
		23GEE101 - Programming in C	2	2.3	2.3	1.2	2	1.7	1	0.8	2	0.2	2.8	2.3	1.8	2.2	-	-
		23EEC101 - Soft Skills	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		23MDC101 - Induction Program (2 Weeks)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	II	23HST201 - Professional English - II	-	-	-	-	2	1.2	1.2	1	2	3	-	3	-	-	-	
		23MAT201 - Statistics and Numerical Methods with MATLAB	3	3	1	1	2	-	-	-	1	-	2	3	-	-	-	
		23PHT202 - Advanced Physics for Computer Engineering	3	2	1	1	1	1	1	-	-	-	-	-	-	-	-	
		23CYT201 - Environmental Science and Sustainability	1.5	1.8	2.2	1.8	1.5	1.4	2.2	2	1	2	-	1	-	-	-	
		23HST202 - தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		23GEE201 - Engineering Graphics	3	2	2	-	2	2	-	-	-	2	-	2	2	2	2	2
		23EEE202 - Basic Electrical And Electronics Engineering	3	3	3	2.8	3	-	-	-	3	2	-	3	3	1	2	2
23GEL201 - Engineering Practices Laboratory	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1	1		
23EEC201 - Communication Skills/Foreign Language	-	-	-	-	-	1.2	1.5	1.5	1.8	3	-	3	-	-	-	-		





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		23MDC201 - Life skills & Leadership Enhancement Programme	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
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	3	
II	III	23MAT303 - Discrete Mathematics	3	3	2	1	-	-	-	-	-	1	-	-	-	-	-	-
		23ADT301 - Data Structures Design	2	2	1	2	2	1	1	-	1	1	1	2	2	2	2	2
		23ADT302 - Programming Using Java	2	1	2	2	2	-	-	-	2	2	1	2	3	2	2	2
		23ADE301 - Foundations of Artificial Intelligence	2	1	2	2	1	-	-	-	2	2	2	2	2	2	2	2
		23GEE301-Problem Solving and Python Programming	2	3	3	3	2	-	-	-	-	-	2	2	3	3	-	-
		23ECE303- Digital Principles and Computer Architecture	3	2	2	3	2	2	-	-	-	-	2	2	3	3	2	2
		23EEEC301 - Professional Development	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	IV	23ADT401 - Computer Networking	2	2	2	2	2	-	-	-	2	2	2	1	2	2	2	
		23ITT401 - Object Oriented Software Design	2.5	1.6	1.8	2	1	-	-	-	2	1.5	1.8	2.6	1.6	1.6	1.8	
		23CST302- Operating Systems	2	2	2	1	-	-	-	-	2	2	2	2	2	1	2	
		23ADE401 - Data Science and Analytics	1	1	2	2	2	-	-	-	2	2	2	2	2	2	1	
		23ADE402 - Machine Learning Essentials	2	2	3	2	2	-	-	-	2	2	2	2	2	2	1	
		23CSE402- Database Management Systems	2	2	3	2	1	-	-	-	2	2	2	2	2	2	3	
23EEEC401 - Value Added Course - I	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			





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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.Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE - FIRST SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23HST101	Professional English - I	HS	3	0	0	3	40	60	100
23MAT101	Matrices and calculus	BS	3	1	0	4	40	60	100
23HST102	தமிழர்மரபு / Heritage of Tamils	HS	1	0	0	1	40	60	100
EMBEDDED COURSE									
23PHE102	Applied Physics for Computer Engineering	BS	3	0	2	4	50	50	100
23CYE101	Engineering Chemistry	BS	3	0	2	4	50	50	100
23GEE101	Programming in C	ES	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC101	Soft 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
CIA	:	Continuous Internal Assessment
ESE	:	End Semester Examination
TOT	:	Total





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B. Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE –SECOND SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credi C	Maximum Marks		
			L	T	P		CIA	ESE	TOT
THEORY									
23HST201	Professional English II	HS	3	0	0	3	40	60	100
23MAT201	Statistics and Numerical Methods With MATLAB	BS	3	1	0	4	40	60	100
23PHT202	Advanced Physics for Computer Engineering	BS	3	0	0	3	40	60	100
23CYT201	Environmental Science and Sustainability	HS	3	0	0	3	40	60	100
23HST202	தமிழ்ரும்தொழில்நுட்பமும் / Tamils and Technology	HS	1	0	0	1	40	60	100
EMBEDDED COURSE									
23GEE201	Engineering Graphics	ES	3	0	2	4	50	50	100
23EEE202	Basic Electrical And Electronics Engineering	ES	3	0	2	4	50	50	100
PRACTICALS									
23GEL201	Engineering Practices Laboratory	ES	0	0	4	2	60	40	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC201	Communication Skills/Foreign Language	EEC	0	0	4	2	100	-	100
MANDATORY COURSE									
23MDC201	Life skills & Leadership Enhancement Programme	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
OE	:	Open Elective
GE	:	General Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
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B. Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE - THIRD SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23MAT303	Discrete Mathematics	BS	3	1	0	4	40	60	100
23ADT301	Data Structures Design	PC	3	0	0	3	40	60	100
23ADT302	Programming Using Java	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23ADE301	Foundations of Artificial Intelligence	PC	3	0	2	4	50	50	100
23GEE301	Problem Solving and Python Programming	ES	3	0	2	4	50	50	100
23ECE303	Digital Principles and Computer Architecture	ES	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC301	Professional Development	EEC	0	0	2	1	100	-	100
TOTAL CREDITS IN SEMESTER - III						23			

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





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B. Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE - FOURTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23ADT401	Computer Networking	PC	3	0	0	3	40	60	100
23 ITT401	Object Oriented Software Design	PC	3	0	0	3	40	60	100
23CST302	Operating Systems	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23ADE401	Data Science and Analytics	PC	3	0	2	4	50	50	100
23ADE402	Machine Learning Essentials	PC	3	0	2	4	50	50	100
23CSE402	Database Management Systems	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC401	Value Added Course-I	EEC	0	0	4	2	100	-	100
TOTAL CREDITS IN SEMESTER - IV						23			

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





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B. Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE - FIFTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23ADT501	IOT and its Applications	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									
23ADE501	Deep Learning	PC	3	0	2	4	50	50	100
23ADE502	Web Essentials	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC501	Value Added Course-II	EEC	0	0	4	2	100	-	100
MANDATORY COURSE									
23MDC501	Mandatory Course I	MC	3	0	0	0	-	-	-
TOTAL CREDITS IN SEMESTER - V						23			

- HS : Humanities and Social Sciences
- BS : Basic Sciences
- ES : Engineering Sciences
- PC : Professional Core
- PE : Professional Elective
- OE : Open Elective
- GE : General Elective
- EEC : Employability Enhancement Courses
- MC : Mandatory Courses
- L : Lecture
- T : Tutorial
- P : Practical
- C : Credit Point
- CIA : Continuous Internal Assessment
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B. Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE - 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									
23ADE601	Business Intelligence	PC	3	0	2	4	50	50	100
23ADE602	Natural Language Processing	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23ADJ601	Project Work	EEC	0	0	10	5	40	60	100
MANDATORY COURSE									
23MDC601	Mandatory Course II	MC	3	0	0	0	-	-	-
TOTAL CREDITS IN SEMESTER - VI						25			

- HS : Humanities and Social Sciences
- BS : Basic Sciences
- ES : Engineering Sciences
- PC : Professional Core
- PE : Professional Elective
- OE : Open Elective
- GE : General Elective
- EEC : Employability Enhancement Courses
- MC : Mandatory Courses
- L : Lecture
- T : Tutorial
- P : Practical
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B. Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE - SEVENTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit C	Maximum Marks		
			L	T	P		CIA	ESE	TOT
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									
23EEC701	Research Paper Writing and Publication	EEC	0	0	4	2	100	-	100
TOTAL CREDITS IN SEMESTER - VII						14			

- HS : Humanities and Social Sciences
- BS : Basic Sciences
- ES : Engineering Sciences
- PC : Professional Core
- PE : Professional Elective
- OE : Open Elective
- GE : General Elective
- EEC : Employability Enhancement Courses
- MC : Mandatory Courses
- L : Lecture
- T : Tutorial
- P : Practical
- C : Credit Point
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B. Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE - EIGHTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
EMPLOYABILITY ENHANCEMENT COURSE									
23ADJ801	Innovative Product Development	EEC	0	0	14	7	40	60	100
23EEC801	Internship	EEC	0	0	4	2	100	-	100
TOTAL CREDITS IN SEMESTER - VIII						9			

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





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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		C	CIA	ESE
23HST101	Professional English - I	HS	3	0	0	3	40	60	100
23HST102	தமிழர்மரபு / Heritage of Tamils	HS	1	0	0	1	40	60	100
23HST201	Professional English - II	HS	3	0	0	3	40	60	100
23CYT201	Environmental Sciences and Sustainability	HS	3	0	0	3	40	60	100
23HST202	தமிழரும் தொழில்நுட்பமும் / Tamil and Technology	HS	1	0	0	1	40	60	100
23HST701	Human Values and Ethics	HS	3	0	0	3	40	60	100

LIST OF BASIC SCIENCES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
23MAT101	Matrices and Calculus	BS	3	1	0	4	40	60	100
23PHE102	Applied Physics for Computer Engineering	BS	3	0	2	4	40	60	100
23CYE101	Engineering Chemistry	BS	3	0	2	4	40	60	100
23MAT201	Statistics and Numerical Methods with MATLAB	BS	3	0	0	3	40	60	100
23PHT202	Advanced Physics for Computer Engineering	BS	3	1	0	4	40	60	100
23MAT301	Discrete Mathematics	BS	3	1	0	4	40	60	100

LIST OF ENGINEERING SCIENCES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
23GEE101	Programming in C	ES	3	0	2	4	50	50	100
23GEE201	Engineering Graphics	ES	3	0	2	4	50	50	100
23EEE202	Basic Electrical And Electronics Engineering	ES	3	0	2	4	50	50	100
23GEL201	Engineering Practices Laboratory	ES	0	0	4	2	60	40	100





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23GEE301	Problem Solving and Python Programming	ES	3	0	2	4	50	50	100
23ECE303	Digital Principles and Computer Architecture	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		C	CIA	ESE
23ADT301	Data Structures Design	PC	3	0	0	3	40	60	100
23ADT302	Programming Using Java	PC	3	0	0	3	40	60	100
23ADE301	Foundation of Artificial Intelligence	PC	3	0	2	4	50	50	100
23ADT401	Computer Networking	PC	3	0	0	3	40	60	100
23 ITT401	Object Oriented Software Design	PC	3	0	0	3	40	60	100
23CST302	Operating Systems	PC	3	1	0	4	40	60	100
23ADE401	Data Science and Analytics	PC	3	0	2	4	50	50	100
23ADE402	Machine Learning Essentials	PC	3	0	2	4	50	50	100
23CSE402	Database Management Systems	PC	3	0	2	4	50	50	100
23ADT501	IOT and Its Applications	PC	3	1	0	4	40	60	100
23ADE501	Deep Learning	PC	3	0	2	4	50	50	100
23ADE502	Web Essentials	PC	3	0	2	4	50	50	100
23ADE601	Business Intelligence	PC	3	0	2	4	50	50	100
23ADE602	Natural Language Processing	PC	3	0	2	4	50	50	100

LIST OF PROFESSIONAL ELECTIVE COURSES

PROFESSIONAL ELECTIVE - I

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
23ADP501	Mobile Applications and its Development	PE	3	0	0	3	40	60	100
23ADP502	R Programming	PE	3	0	0	3	40	60	100
23ADP503	Knowledge Engineering	PE	3	0	0	3	40	60	100
23ADP504	Design and Analysis of Algorithms	PE	3	0	0	3	40	60	100





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23ADP505	Network Security	PE	3	0	0	3	40	60	100
23CSP504	Text and Speech Analysis	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		C	CIA	ESE
23CSP606	Cyber Security	PE	3	0	0	3	40	60	100
23 ITP502	Computer Vision	PE	3	0	0	3	40	60	100
23CSP508	Cloud Services Management	PE	3	0	0	3	40	60	100
23CSP510	Software Testing and Automation	PE	3	0	0	3	40	60	100
23CSP512	DevOps	PE	3	0	0	3	40	60	100
23ADP506	Artificial Intelligence and Robotics	PE	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE - III

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
23ADP507	Ethics of Artificial Intelligence	PE	3	0	0	3	40	60	100
23ADP508	Data Visualization	PE	3	0	0	3	40	60	100
23ADP509	Data Warehousing	PE	3	0	0	3	40	60	100
23CSP514	Software Defined Networks	PE	3	0	0	3	40	60	100
23CSP515	Stream Processing	PE	3	0	0	3	40	60	100
23ADP510	Embedded Systems and Medical Things	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		C	CIA	ESE
23CSP601	Hacking Techniques	PE	3	0	0	3	40	60	100





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23ITP601	Digital and MobileForensics	PE	3	0	0	3	40	60	100
23CSP602	Social Network Security	PE	3	0	0	3	40	60	100
23CSP603	Engineering Secure Software Systems	PE	3	0	0	3	40	60	100
23ITP602	Information Security	PE	3	0	0	3	40	60	100
23ADP601	Fundamentals of Healthcare Analytics	PE	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE - V

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
23CSP604	Augmented Reality / Virtual Reality	PE	3	0	0	3	40	60	100
23CSP605	Robotic Process Automation	PE	3	0	0	3	40	60	100
23ADP601	Neural Networks and Deep Learning	PE	3	0	0	3	40	60	100
23CCP503	Cloud Security	PE	3	0	0	3	40	60	100
23CSP607	Quantum Computing	PE	3	0	0	3	40	60	100
23CSP609	Cognitive Science	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		C	CIA	ESE
23CSP608	Soft Computing	PE	3	0	0	3	40	60	100
23CSP516	Security and Privacy in Cloud	PE	3	0	0	3	40	60	100
23CCP602	Cryptocurrency and Blockchain Technologies	PE	3	0	0	3	40	60	100
23CSP610	OptimizationTechniques	PE	3	0	0	3	40	60	100
23CSP611	GameTheory	PE	3	0	0	3	40	60	100
23CSP509	UI and UX Design	PE	3	0	0	3	40	60	100





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LIST OF OPEN ELECTIVE COURSES

OPEN ELECTIVE - I

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
23MEO601	Introduction to Industrial Engineering	OE	3	0	0	3	40	60	100
23ECO602	Fundamentals of Electronic Devices and Circuits	OE	3	0	0	3	40	60	100
23EEO603	Electric Vehicle Technology	OE	3	0	0	3	40	60	100
23EEO604	Renewable Energy System	OE	3	0	0	3	40	60	100
23MEO605	Resource Management Technique	OE	3	0	0	3	40	60	100
23MAO606	Graph Theory	OE	3	0	0	3	40	60	100
23CEO607	Environmental and Social Impact Assessment	OE	3	0	0	3	40	60	100
23PMO608	Pharmaceutical Nanotechnology	OE	3	0	0	3	40	60	100
23RAO609	Foundation of Robotics	OE	3	0	0	3	40	60	100
23CSO610	Introduction to Drone Technologies	OE	3	0	0	3	40	60	100
23MDO611	Bio Molecules	OE	3	0	0	3	40	60	100
23CSO612	Cyber Forensics and Ethical Hacking	OE	3	0	0	3	40	60	100

OPEN ELECTIVE- II

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
23HSO701	English for Competitive Examinations	OE	3	0	0	3	40	60	100
23MGO702	Democracy and Good Governance	OE	3	0	0	3	40	60	100
23MEO703	Fundamentals of Mechatronics	OE	3	0	0	3	40	60	100
23CEO704	Remote Sensing Concepts	OE	3	0	0	3	40	60	100
23MEO704	Nano Technology	OE	3	0	0	3	40	60	100
23MDO705	Ultrasound Principles and its Medical Applications	OE	3	0	0	3	40	60	100
23PMO706	IPR for Pharma Industry	OE	3	0	0	3	40	60	100





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23RAO707	Concepts in Mobile Robots	OE	3	0	0	3	40	60	100
23ECO708	Energy Technology	OE	3	0	0	3	40	60	100
23EEO709	Sensors and Actuators	OE	3	0	0	3	40	60	100
23MAO710	Operations Research	OE	3	0	0	3	40	60	100
23CSO711	Introduction to Cyber Security	OE	3	0	0	3	40	60	100
23MEO712	3D Printing and Design	OE	3	0	0	3	40	60	100

OPEN ELECTIVE - III

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
23HSO713	Project Report Writing	OE	3	0	0	3	40	60	100
23MAO714	Advanced Numerical Methods	OE	3	0	0	3	40	60	100
23CSO715	Fundamentals of Block Chain Technology	OE	3	0	0	3	40	60	100
23EEO716	Electrical, Electronic and Magnetic Materials	OE	3	0	0	3	40	60	100
23CEO717	Geographical Information System	OE	3	0	0	3	40	60	100
23ECO718	VLSI Design	OE	3	0	0	3	40	60	100
23MDO719	Wearable Technology	OE	3	0	0	3	40	60	100
23MEO720	Additive manufacturing	OE	3	0	0	3	40	60	100
23RAO721	Nano Materials and Application	OE	3	0	0	3	40	60	100
23MGO722	Cost Management of Engineering Projects	OE	3	0	0	3	40	60	100
23HSO723	Food Safety and Quality Regulations	OE	3	0	0	3	40	60	100
23MDO724	Lifestyle Diseases	OE	3	0	0	3	40	60	100

GENERAL ELECTIVES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
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





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23NCCL03	NCC ARMY LEVEL - 3	GE	3	0	0	3	40	60	100
23NCCL04	NCC ARMY LEVEL - 4	GE	3	0	0	3	40	60	100

ELECTIVE - MANAGEMENT

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
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	Hospital Management	GE	3	0	0	3	40	60	100
23MGT708	e-Waste Management	GE	3	0	0	3	40	60	100

LIST OF EMPLOYABILITY ENHANCEMENT COURSES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
23EEC101	Soft Skills	EEC	1	0	0	1	100	-	100
23EEC201	Communication Skills	EEC	0	0	4	2	100	-	100
23EEC301	Professional Development	EEC	0	0	2	1	100	-	100
23EEC401	Value Added Course-I	EEC	0	0	4	2	100	-	100
23EEC501	Value Added Course-II	EEC	0	0	4	2	100	-	100
23EEJ601	Project Work	EEC	0	0	10	5	40	60	100
23EEC701	Research Paper Writing and Publication	EEC	0	0	4	2	100	-	100
23EEJ801	Innovative Product Development	EEC	0	0	14	7	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		C	CIA	ESE
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		C	CIA	ESE
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.Tech. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Category	Credits Per Semester								Credit Total
	I	II	III	IV	V	VI	VII	VIII	
HS	4	7	-	-	-	-	3	-	14
BS	12	7	4	-	-	-	-	-	23
ES	4	6	8	-	-	-	-	-	18
GE	-	-	-	-	-	-	3	-	3
PC	-	4	10	21	12	8	-	-	55
PE	-	-	-	-	9	9	-	-	18
OE	-	-	-	-	-	3	6	-	9
EEC	1	2	1	2	2	5	2	9	24
MC	-	-	-	-	-	-	-	-	-
Total	21	26	23	23	23	25	14	9	164





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SCHEME FOR SYLLABI

*B.Tech. - Artificial Intelligence and Data
Science*





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SEMESTER I

23HST101

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

L T P C
3 0 0 3

OBJECTIVES

- To develop learning English language through grammar.
- To use grammar efficiently for demonstrating all the four language skills (LSRW).
- To write business letters, dialogue writing, paragraph and essay writing.
- To speak effectively about self introduction and real time situation.
- To build the reading skills through reading comprehension and note taking.

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

Mandatory activity: Self Introduction

OUTCOMES

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

- Use a wide range of vocabulary in oral and written communication
- Frame grammatically correct sentences.
- Write letters, frame paragraphs and Essays, develop conversation.
- Develop speaking skills for self-Introduction, delivering speeches and Technical





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Presentation

- Read and comprehend the passage, technical content and take notes

TEXT BOOKS

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

REFERENCES

1. Department of English, Anna University, "Mindscapes: English for Technologists and Engineers", First Edition, Orient Black Swan, Chennai, 2012.
2. MacMillan, Krishna Mohan, Meera Banerji, Developing Communication Skills, Paperback, 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	PSO3
1	-	-	-	-	-	1	3	1	2	3	-	3	-	-	-
2	-	-	-	-	-	1	2	-	1	3	-	3	-	-	-
3	-	-	-	-	-	3	3	2	3	3	-	3	-	-	-
4	-	-	-	-	-	1	2	1	2	3	-	3	-	-	-
5	-	-	-	-	-	1	1	1	1	3	-	3	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	-	-	-	-	-	1.40	2.20	1.25	1.80	3.00	-	3.00	-	-	-

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





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23MAT101

MATRICES AND CALCULUS

L T P C

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

3 1 0 4

OBJECTIVES

- To develop the use of matrix algebra techniques those are needed by engineers for practical applications.
- To familiarize the students with differential and integral calculus.
- To describe the student with functions of several variables.
- To acquire the student with mathematical tools needed in evaluating multiple integrals and their applications.
- To acquaint the student with the concepts of vector calculus that is needed for problems in engineering disciplines.

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.

LIST OF TUTORIALS

1. Computation of Eigen values and Eigenvectors.
2. Calculate differentiation and integration of simple functions.
3. Determining Maxima and minima of functions for two variables.
4. Evaluating double and triple integrals.
5. Computing Gradient, divergence and curl of point functions.





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TOTAL: 45+15 = 60 PERIODS

OUTCOMES

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

- Classify the matrix algebra methods for solving practical problems.
- Discover differential calculus tools in solving various application problems and compare different methods of integration in solving practical problems.
- Develop differential calculus ideas on several variable functions.
- Apply multiple integral ideas in solving areas, volumes and other practical problems.
- Solve engineering problems using the concept of vector calculus.

TEXT BOOKS

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

REFERENCES

1. Bali N.P, Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, Seventh Edition, 2009.
2. Kanti B. Dutta., "Mathematical Methods of Science and Engineering – Aided with MATLAB", Cengage Learning, New Delhi, 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	PSO3
1	3	3	2	-	-	-	-	-	-	-	1	2	-	-	-
2	3	3	2	-	-	-	-	-	-	-	1	2	-	-	-
3	3	3	2	-	-	-	-	-	-	-	1	2	-	-	-
4	3	3	2	-	-	-	-	-	-	-	1	2	-	-	-
5	3	3	2	-	-	-	-	-	-	-	1	2	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	3	3	2	-	-	-	-	-	-	-	1	2	-	-	-

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





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23HST102

HERITAGE OF TAMILS

L T P C

1 0 0 1

UNIT I LANGUAGE AND LITERATURE

3

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

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

3

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

UNIT III FOLK AND MARTIAL ARTS

3

Therukoothu, Karagattam, VilluPattu, KaniyanKoothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils

UNIT IV THINAI CONCEPT OF TAMILS

3

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

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

TEXT BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்)
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)





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





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23HST102

தமிழர் மரபு

L T P C

1 0 0 1

அலகு I மொழி மற்றும் இலக்கியம்:

3

இந்திய மொழிக் குடும்பங்கள்- திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி- தமிழ் செவ்விலக்கியங்கள்- சங்க இலக்கியத்தின் சமய சார்பற்ற தன்மை- சங்க இலக்கியத்தில் பகிர்தல் அறம்-திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க்காப்பியங்கள், தமிழத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வாழ்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு II மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள்வரை - சிற்பக்கலை:

3

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள்- பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினை பொருட்கள் ,பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள்- குமரிமுனையில் திருவள்ளூர் சிலை - இசைக் கருவிகள்- மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு III நாட்டுப்புற கலைகள் மற்றும் வீரவிளையாட்டுகள்:

3

தெருக்குத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான்கூத்து, ஒயிலாட்டம், தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி ,புலியட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு IV தமிழர்களின் திணைக்கோட்பாடுகள்:

3

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





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அலகு V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாற்றறிக்குத்
தமிழர்களின் பங்களிப்பு 3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு இந்தியாவின் பிற்பகுதிகளில்
தமிழ்ப் பண்பாட்டின் தாக்கம் - சுய மரியாதை இயக்கம் - இந்திய
மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள்
,கையழுத்துப்படிகள் - தமிழ்ப்புத்தகங்களின் அச்ச வரலாறு.

TOTAL: 15 PERIODS

TEXT - CUM - REFERENCE BOOKS

1. தமிழக வரலாறு -மக்களும் பண்பாடும் - கே. கே. பிள்ளை (வெளியீடு:
தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் -முனைவர் இல. சுந்தரம். (விகடன்பிரசுரம்)
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல்
துறை வெளியீடு)
4. பொருறை-ஆற்றங்கரை நாகரிகம் (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 river Vaigai' (Jointly Published by:
Department of Archaeology & Tamil Nadu Text Book and Educational Services
Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay)
(Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text
Book and Educational Services Corporation, Tamil Nadu)
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23PHE102

APPLIED PHYSICS FOR COMPUTER ENGINEERING
(Common to CSE, CSE-SC, IT and AI&DS)

LT P C
3 0 2 4

OBJECTIVES

- To explore the principles of lasers and the uses for them in general.
- To Utilize Schrödinger's wave equation and the fundamentals of quantum mechanics to investigate the complicated physical phenomena.
- To understand the basic concepts of IC's and digital components.
- To enhance the knowledge on magnetic and optical storage devices.
- To learn the fundamentals of nano material's and synthesis methods.
- To observe the physical concept used in the fields of semiconductors, optics and electronics.

UNIT I PHOTONICS

9

Spontaneous and Stimulated Emission- Population Inversion - Derivation of Einstein's A and B coefficients – Principle and working of Laser - Nd:YAG laser – He Ne Laser - Direct bandgap and Indirect Bandgap Semiconductors - Semiconductor Diode Laser (Homojunction & heterojunction) - Applications of Lasers in Science, Engineering and Medicine – Working principle of Laser printer - Digital Laser Material Processing technology – Laser Projection Television.

UNIT II QUANTUM PHYSICS

9

Black Body Radiation – Planck's theory (derivation) – Wave particle duality – Electron Diffraction – Wave function and its Physical significance – Schrödinger's wave equation: Time Independent and Time Dependent Equations – Particle in a One-Dimensional Box - Scanning Electron Microscope - Transmission Electron Microscope - Quantum Tunneling – Scanning Tunneling Electron Microscope.

UNIT III FUNDAMENTALS OF DIGITAL ELECTRONICS AND LOGIC DESIGN

9

INTEGRATED ELECTRONICS: Introduction of ICs - Steps in Fabrication of Monolithic IC's – General applications of IC's.

DIGITAL ELECTRONICS AND LOGIC DESIGN : Number System and Representation - Programs - Boolean Algebra and Logic Gates – Demorgan's Theorem - Gate Level Minimization - Combinational Logic Circuits - Flip-Flops and Sequential Circuits - Register and Counters - Memory and Programmable Logic Devices.

UNIT IV DATA STORAGE MATERIALS

9

PRIMARY STORAGE: Random Access Memory (RAM)– Static RAM – Dynamic RAM – Read only Memory (ROM) - **SECONDARY STORAGE :** Magnetic Disc Memories –Hard Disk Drive and Solid State Drive -

TERTIARY STORAGE : Optical Data Storage Devices: Principle-Disc data storage-Structure and Operating Principle of CD-ROM – DVD - Blu-ray Disc - **OFF-LINE STORAGE :** Floppy Disk – Zip diskette – USB Flash drive – Memory card – **FUTURE STORAGE DEVICES (QUALITATIVE) :** Holographic data storage - DNA digital data storage - Helium Drives - Shingled Magnetic Recording (SMR) - non-volatile, random access memories (NVRAM) - Rack scale design - 5D Optical storage.

UNIT V INTRODUCTION TO NANO SCIENCE & NANOELECTRONICS

9

Emergence of Nanoscience - Role of Particle Size - quantum structures: Quantum Well, Quantum Wire And Quantum Dot- Properties at Nano scale (optical, electronic and





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magnetic) - Synthesis of Nanomaterials : Physical Vapour Deposition (PVD) - Pulsed Laser Deposition (PLD) - Ball Milling- NANO-ELECTRONIC TECHNOLOGIES : Nano capacitors, Single electron transistors, Coulomb blockade, Nano lithography - Data storage – Nano Photonics - Nano Electronic and Magnetic Devices – Spintronics - Nanotechnology in Computer Science.

LIST OF EXPERIMENTS

(Common to CSE, CSE-SC, IT and AIDS)

(Eight experiments are to be conducted in Lab)

1. Determination of wavelength of laser.
2. Determination of particle Size lycopodium powder using laser.
3. Fibre Optics: Determination of Numerical Aperture and Acceptance angle.
4. Determination of velocity of ultrasonic in liquid.
5. Verification of truth tables of logic gates using IC's: (OR, AND, NOT, XOR, NOR and NAND)
6. Verification of Universal NOR & NAND gates.
7. Determination of Young's modulus - Uniform bending.
8. Determination of bandgap of a given semiconductor diode.
9. Determination of Kinetic Energy - Photoelectric Effect.(Virtual).
10. Determination of frequency of an electrically driven tuning fork- Melde's string method (Virtual)

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

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

- Learn the basics of lasers and their use in some applications
- Apply the basic principles of quantum mechanics and Schrödinger's wave equation to study the complex physical phenomenon
- Acquire knowledge and apply it to various electronic devices
- Get knowledge about storage material and devices
- Understand the fundamentals of nano materials and various synthesize methods.
- Compose principles of elasticity, optics and semiconductor properties in engineering applications through experiments

TEXT BOOKS

1. A Text book of Material Science, K.G.Aswani, S. Chand & Company Ltd, (2001).
2. Semiconductor Physics and Optoelectronics, M.Arumugam, Anuradha Agencies, 2019.
3. Nanostructured Materials and Nanotechnology - Hari Singh Nalwa, Academic Press, 2012 .

REFERENCES

1. Avadhanulu M.N & Kshirsagar P.G "Text Book of Engineering Physics". S.Chand, 2006
2. Hanson, G.W. "Fundamentals of Nanoelectronics". Pearson Education, 2009





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3. Nanocrystals: Synthesis, Properties and Applications, C.N.R. Rao, P.J. Thomas and G.U. Kulkarni, Springer (2007).

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/122/107/122107035/>
2. <https://nptel.ac.in/courses/118102003>

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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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23CYE101

ENGINEERING CHEMISTRY

LT P C

(Common to CSE, EEE, ECE, CSE (CS), MDE, AI&DS, IT &PT) **3 0 2 4**

OBJECTIVES

- To classify the impurities of water and know the treatment and the conditioning methods for domestic and industrial uses.
- To develop an understanding the fundamentals of polymers.
- To gain knowledge the phase rule and its applications in engineering field.
- To explain the basics of Nanochemistry, synthesis, properties and applications of nano materials.
- To be familiar with the types of corrosion and control measures and working of batteries.
- 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 (colloidal, phosphate, calgon and carbonate conditioning methods) - External conditioning - Zeolite process, Demineralization process – Desalination of brackish water by reverse osmosis- Nano filtration - Municipality water treatment - Break point chlorination.

UNIT II POLYMER CHEMISTRY

9

Introduction - Classification of polymers - Natural and Synthetic; Thermoplastic and Thermosetting plastic. Functionality - Degree of polymerization. Types of polymerization: Addition Condensation and Copolymerization, Properties of polymers: Glass transition temperature, Tacticity- Molecular weight - Weight average, Number average and Polydispersity index- Preparation, properties and uses of PVC, Nylon 6,6, Polyethylene - Rubbers - Types - Vulcanization of rubber - Plastics - Moulding constituents of plastics - Moulding of plastics - Compression, injection and blow moulding - Biodegradable polymers - Conducting polymers.

UNIT III PHASE RULE AND ALLOYS

9

Phase rule - Explanation of terms involved - One component system - Water system - Condensed phase rule - Construction of phase diagram by thermal analysis - Simple eutectic systems (Lead - Silver system only). Alloys: Introduction - Definition - Properties of alloys - Significance of alloying, functions and effect of alloying elements - Ferrous alloys - Nichrome and stainless steel - Heat treatment of steel, non-ferrous alloys - Brass and bronze.

UNIT IV CHEMISTRY OF NANO MATERIALS

9

Nano chemistry - Basics (Surface area to volume ratio - Quantum confinement - 0D, 1D, 2D& 3D) - Distinction between molecules, nanoparticles and bulk materials - Characterization of nanomaterials using EDX and HR-TEM. Synthesis of nano materials: Top down approach - Ball milling - Bottom up approach - Sol-gel method, Chemical vapour deposition - Properties of nanomaterials and Applications of nanomaterials (Nano products of today).





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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, Potentiometric titration - Redox titration, Conductometric titration- Strong acid vs Strong base. 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.

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 = 60 PERIODS

OUTCOMES

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

- Infer the quality of water and Identify the method of removal of impurities from water for domestic and industrial purpose.
- Identify the different types of polymers, polymerization processes and some special properties and applications of polymers.
- Apply the knowledge of phase rule to alloy making for various engineering applications.
- Discuss the fundamentals of the nano materials and apply the basic concepts of nanochemistry in engineering applications.
- Analyze the causes of corrosion, suggest the control measures and discuss the functions of batteries.
- 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", Seventeenth Edition, Dhanpet Rai Publishing Company (P) Ltd. New Delhi, 2015.
2. Viswanathan B, "Nanomaterials" Alpha Science International Ltd, 2009.
3. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, Second Edition, 2017.





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REFERENCES

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company Ltd, New Delhi, 2015.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2012.
3. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.

E-RESOURCES

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

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	3	-	1	-	3	-	-	-	-	2	-	-	-
2	1	-	2	-	1	-	-	-	-	-	-	-	-	-	-
3	2	2	3	1	1	1	-	-	-	-	-	1	-	-	-
4	1	1	2	1	-	-	-	-	-	-	-	-	-	-	-
5	2	1	2	1	3	-	1	-	-	-	-	-	-	-	-
6	2	3	-	2	3	-	-	-	-	-	-	-	-	-	-
AVG	1.6	1.6	2.4	1.25	1.8	1	2	-	-	-	-	1.5	-	-	-

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





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23GEE101

PROGRAMMING IN C
(Lab Embedded Theory Course)

L T P C
3 0 2 4

OBJECTIVES

- To understand the constructs of C Language.
- To study arrays and strings for developing C programs
- To know the functions and pointers application in C programs
- To understand the concepts of structures and Union.
- To understand input/output and file handling in C.
- To develop programs and applications using C.

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.

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.

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.

UNIT IV STRUCTURES

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

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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LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

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

TOTAL: 45 +15 = 60 PERIODS

OUTCOMES

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

- Build C programs for simple applications using basic constructs
- Develop C programs using arrays and strings.
- Construct C programs using functions, recursion and pointers
- Implement applications in C using structures.
- Develop applications in C using file processing.
- Develop applications using C programming constructs

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





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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	PSO3
1	1	2	2	1	2	1	1	1	2	-	3	2	1	2	-
2	2	2	2	1	2	1	1	1	2	-	3	3	2	2	-
3	2	3	2	1	2	1	1	1	2	-	3	2	2	2	-
4	3	2	2	1	3	1	1	1	2	-	3	3	2	2	-
5	2	3	3	1	2	1	2	1	2	-	3	2	2	3	-
6	2	2	3	2	1	2	-	-	2	1	2	2	2	2	-
AVG	2	2.3	2.3	1.16	2	1.7	1	1	2	1	2.8	2.3	1.8	2.2	-

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





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23HST201

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

L T P C
3 0 0 3

OBJECTIVES

- To use grammatical components effectively in written communication.
- To read and understand on comprehend technical writing.
- To develop skills for writing email, business letters, Job Application Letter and Resume.
- To write checklist, recommendation, transcoding graphics and letter.
- To speak fluently in real contexts.

UNIT I GRAMMAR

9

Articles - Prepositions - Compound words - Conditionals - Subject verb agreement - Active and Passive voice - Impersonal Passive Voice.

UNIT II LISTENING & READING

9

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

UNIT III BUSINESS WRITING

9

E-mail writing - fixing an appointment, cancelling appointment, conference details, training programme details, paper submission for seminars and conferences - Job Application Letter and Résumé.

UNIT IV WRITING

9

Checklist - Writing Recommendations - Transcoding Graphics - Bar Chart, Flow Chart, Pie Chart and Tables - Formal Letter Writing - inviting dignitaries and declining invitations.

UNIT V SPEAKING

9

Collaborative task - Turn taking (initiating and responding appropriately) - Negotiating - Exchanging - Suggesting - Comparing and Contrasting – Expressing - Finding out facts, attitudes and opinions - Situational Role-play.

TOTAL: 45 PERIODS

Mandatory activity: PowerPoint Presentation

OUTCOMES

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

- Use grammar to frame sentences and write sentences in passive forms
- Read vocabulary, newspaper and improve listening skills
- Draft emails, write business letters, construct resume with job application letter.
- Frame checklist, write recommendation and Transcoding graphical representation.
- Develop speaking skill for taking part in Collaborative task and Situational Role-play.





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TEXT BOOKS

1. S. Sumant Maven Learning. Technical English II.
2. KN Shoba, Lourdes Joavani Rayen. Communicative English. Published by Cambridge university, 2017.

REFERENCES

1. Dr K Elango, Dr. Veena Selvam, Dr. Sujatha Priyadarshini, "Resonance English for Engineers and Technologists", Cambridge University Press, First Edition, Foundation Books, New Delhi, 2013.
2. Seely, John. Oxford Guide to Effective Writing and Speaking. Indian ed. New Delhi: Oxford University Press. 2005.
3. Norman Whitby, Business Benchmark- Pre-Intermediate to Intermediate, Students book, Cambridge University Press, 2006.

E-RESOURCES

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

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	-	1	1	-	2	3	-	3	-	-	-
2	-	-	-	-	2	1	1	1	2	3	-	3	-	-	-
3	-	-	-	-	2	1	2	1	2	3	-	3	-	-	-
4	-	-	-	-	-	1	1	1	1	3	-	3	-	-	-
5	-	-	-	-	-	2	1	1	3	3	-	3	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	-	-	-	-	2.00	1.20	1.20	1.00	2.00	3.00	-	3.00	-	-	-

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23MAT201

STATISTICS AND NUMERICAL METHODS WITH MATLAB

LT P C

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

3 1 0 4

OBJECTIVES

- To provide the necessary basic concepts in testing of hypothesis for small and large samples which plays an important role in real life problems.
- To acquaint the knowledge of classifications of design of experiments.
- To extend the basic concepts of solving algebraic and transcendental equations.
- To apply the numerical techniques of interpolation and integration.
- To produce the knowledge of various techniques in 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-Bashforth method.

LIST OF TUTORIALS

1. Solving one sample and paired sample 't' test.
2. Determination of roots of a polynomial.
3. Solution of linear system of equations by Gauss Seidel methods.
4. Evaluation of line integrals by Trapezoidal rule.
5. Solution of ordinary differential equations by Euler's method.

TOTAL: 45+15 = 60 PERIODS





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OUTCOMES

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

- Analyze the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments in the field of agriculture.
- Summarize the numerical techniques of interpolation in various intervals and apply the numerical techniques of integration for engineering problems.
- Produce various techniques and methods for solving first and second order ordinary differential equations.
- Solve the partial and ordinary differential equations with initial conditions by using certain techniques with engineering applications.

TEXT BOOKS

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Dr.Kandasamy. P, Dr.Thilagavathy . K and Dr. Gunavathy .K., "Statistics and Numerical Methods", S. Chand and Company Ltd., NewDelhi, 2010.

REFERENCES

1. Burden, R.L and Faires, J.D, "Numerical Analysis", Nineth Edition, Cengage Learning, 2016.
2. Gupta S.C. and Kapoor V.K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, Twelfth12th Edition, New Delhi, 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	PSO3
1	3	3	1	1	2	-	-	-	1	-	2	3	-	-	-
2	3	3	1	1	2	-	-	-	1	-	2	3	-	-	-
3	3	3	1	1	2	-	-	-	1	-	2	3	-	-	-
4	3	3	1	1	2	-	-	-	1	-	2	3	-	-	-
5	3	3	1	1	2	-	-	-	1	-	2	3	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	3	3	1	1	2	-	-	-	1	-	2	3	-	-	-

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





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23PHT202

ADVANCED PHYSICS FOR COMPUTER ENGINEERING

L T P C

(Common to CSE, CSE-SC, IT and AI&DS)

3 0 0 3

OBJECTIVES

- To acquire knowledge on semiconductor and apply it to various electronic devices
- To develop the knowledge in Superconducting and Dielectric materials.
- To make use of the light phenomenon in optical device fabrications.
- To apply the knowledge Quantum Electronics
- To enlarge knowledge about fiber optics and data transmission systems

UNIT I PHYSICS OF SEMICONDUCTORS

9

Elemental and Compound Semiconductors – Intrinsic Semiconductor – Carrier Concentration Derivation – Fermi level – Extrinsic Semiconductor - Carrier Concentration in N-type and P-type semiconductor(Qualitative) – Hall Effect and applications - PN junction Diode – Schottky Diode- Ohmic contacts- Tunnel Diode.

UNIT II MAGNETIC AND SUPERCONDUCTING MATERIALS

9

Electron Theory of Magnetism; Dia, Para, Ferromagnetism and their Properties- Domain Theory of Ferromagnetism – Hard and Soft magnetic Materials - Ferrites - Superconductivity: Properties – Type I and Type II superconductors – BCS theory of superconductivity – General applications of Superconductors –Cryotron and Magnetic Levitation.

UNIT III OPTICAL AND DISPLAY DEVICES

9

Introduction-Electroluminescence Process - LED materials - Fabrication of LED - Liquid Crystal Display - Principle and Fabrication of Twisted Nematic LCD systems - Thin Film Transistor-LCD (TFT-LCD) Organic LED – Fabrication Various types of OLEDs - PDPs (Plasma display panels) – Laser powered phosphor display - Attributes of a good display device.

UNIT IV FIBER OPTICS AND DATA TRANSMISSION SYSTEMS

9

Principle and Propagation of Light in an Optical Fibers - Fiber Optics: Principle, Numerical Aperture, Acceptance Angle & Acceptance cone — types of Optical Fibers (Material, Refractive Index, Mode) – Fiber Optic Communication Systems – Bluetooth - Wi-Fi – Li-Fi – Infrared Data Transfer - Data Transfer Project - Kiss Connectivity.

UNIT V EMERGING TECHNOLOGIES

9

Quantum Computing - 3D Printing - 5G & 6G Cellular Communications - Explainable Artificial Intelligence(AI) - Biometrics - Cloud Computing - Computer-assisted Translation(CAT) - Holographic Imaging - Quantum Cryptography - Robotics - Quick Response Codes (QR codes) -Wearable Computing - Ultra-High Definition(UHD) - Vision Enhancement - Virtual Reality(VR) – Augmented Reality (AR) – Mixed Reality (MR).

TOTAL: 45 PERIODS

OUTCOMES

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

- Acquire knowledge on basics of semiconductor physics and its applications in various devices
- Be familiarizing with superconducting and dielectric properties of materials.
- Understand the function of optical materials and display devices.





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- Expand the knowledge on quantum computing in electronic systems
- Learn the basics of optical fibers and some applications in communication systems

TEXT BOOK

1. R Murugesan "Optics and Spectroscopy" S. Chand Publishing, Fifth Edition (2013)
2. Raghavan V, Materials Science and Engineering: A First Course, PHI Publications, 2015
3. V. Gupta, P. Mandayam and V. S. Sunder. "The Functional Analysis of Quantum Information Theory" In Springer Lecture Notes in Physics, Vol 902 (2015).

REFERENCES

1. Rajendran V. "Engineering Physics". Tata McGraw Hill Publications, 2012.
2. Avadhanulu M.N & Kshirsagar P.G "Text Book of Engineering Physics". S.Chand, 2006.
3. R Murugesan "Modern Physics", S Chand Publishing; Eighteenth edition 2016

E – RESOURCES

1. <https://archive.nptel.ac.in/courses/115/101/115101092/>
2. <https://nptel.ac.in/courses/108104113>

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	1	1	1	1	-	-	-	-	-	-	-	-
2	3	2	1	1	1	1	1	-	-	-	-	-	-	-	-
3	3	2	1	1	1	1	1	-	-	-	-	-	-	-	-
4	3	2	1	1	1	1	1	-	-	-	-	-	-	-	-
5	3	2	1	1	1	1	1	-	-	-	-	-	-	-	-
6	3	2	1	1	1	1	1	-	-	-	-	-	-	-	-
AVG	3	2	1	1	1	1	1	-	-	-	-	-	-	-	-

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





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23CYT201

ENVIRONMENTAL SCIENCE AND SUSTAINABILITY

LT P C

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

3 0 0 3

OBJECTIVES

- To understand the importance of the environment, ecosystem, biodiversity and its conservation.
- To impart knowledge on various kinds of pollutions, solid waste management and precautionary measures for disasters.
- To be familiar with the social issues and identify the possible way to improve the quality of the environment.
- To analyze the problems of overpopulation and understand the value education.
- To familiarize the concept of sustainability and implement sustainable practices in various fields.

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) desert ecosystem (d) aquatic ecosystems (ponds, rivers, oceans) - Introduction to biodiversity definition: genetic, species and ecosystem diversity - Biogeographically classification of India - Value of biodiversity - India as a mega-diversity nation - Hot-spots 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 (f) Thermal pollution (g) Nuclear hazards – 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

From unsustainable to sustainable development – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, case studies - Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – Wasteland reclamation – Green Chemistry and principles - Environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – Public awareness.

Activity: Creating environmental awareness.





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UNIT IV HUMAN POPULATION AND THE ENVIRONMENT

9

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

Activity: Visit to local primary health center.

UNIT V SUSTAINABLE MANAGEMENT

9

Sustainability-Concept, needs and challenges-economic, social and aspects of sustainability-From unsustainability to sustainability-Millennium development goals, and protocols-Sustainable Development Goals-Targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-Case studies. Zero waste and R concept, Material Life cycle assessment, Environmental Impact 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:

- Acquire knowledge on public awareness & about the environment, ecosystem and biodiversity.
- Find solutions for pollutions and waste management to improve the quality of environment.
- Identify the causes of social issues and apply the concept of green chemistry to maintaining a clean environment.
- Analyze the effects of human population and issues related to the environment and human health.
- Understand the different goals of sustainable development and apply them for suitable technological advancement and societal development.

TEXT BOOKS

1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', Second edition, Pearson Education, 2004.
3. Allen, D. T. and Shonnard, D. R., 'Sustainability Engineering: Concepts, Design and Case Studies', Prentice Hall.

REFERENCES

1. Erach Bharucha, 'Textbook of Environmental Studies', Universities Press(I) Pvt Ltd, Hyderabad, 2015.
2. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India Pvt Ltd, New Delhi, 2007.
3. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.





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E-RESOURCES

1. <https://nptel.ac.in/courses/122102006/>
2. <https://swayam.gov.in/nd1-noc19-ge22/preview>

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	1	3	2	-	1	3	-	1	-	-	1	-	-	-
2	2	2	2	2	2	2	1	-	-	-	-	-	-	-	-
3	-	2	2	2	1	1	3	-	-	-	-	-	-	-	-
4	1	2	2	1	1	2	3	3	-	-	-	-	-	-	-
5	-	2	2	2	2	1	1	1	-	2	-	-	-	-	-
AVG	1.5	1.8	2.2	1.8	1.5	1.4	2.2	2	1	2	-	1	-	-	-

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





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23HST202

TAMILS AND TECHNOLOGY

LT P C

1 0 0 1

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)-ThirumalaiNayakar 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 beads - 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

TEXT BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணிணித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன்பிரசுரம்)
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம் (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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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 river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.





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23HST202

தமிழரும் தொழில்நுட்பமும்

L T P C

1 0 0 1

அலகு I நெசவு மற்றும் பானைத் தொழில்நுட்பம்:

3

சங்க காலத்தில் நெசவுத் தொழில் – பானைத்தொழில்நுட்பம் – கருப்பு சிவப்பு பாண்டங்கள் – பண்டங்களில் கீறல் குறியீடுகள்.

அலகு II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:

3

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்ககாலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு- சங்ககாலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரம் சிற்பங்களும், கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக்கோயில்கள் மாதிரி கட்டமைப்புகள் பற்றி அறிதல் மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள்-பிரிட்டிஷ்காலத்தில் சென்னையில் இந்தோ – சரோசெனிக் கட்டிடக் கலை.

அலகு III உற்பத்தித் தொழில்நுட்பம்:

3

கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சலை –இரும்பை உருக்குதல், எஃகு – வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள்,கண்ணாடி மணிகள் – சுடுமண் மணிகள் – சங்குமணிகள் – எலும்புத்துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு IV வேளாண்மை மற்றும் நீர்பாசனத் தொழில் நுட்பம்:

3

அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமிழித் தூம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்து பண்டைய அறிவு – அறிவுசார் சமூகம்.





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அலகு V அறிவியல் தமிழ் மற்றும் கணித்தமிழ்:

3

அறிவியல் தமிழின் வளர்ச்சி – கணித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின்நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்

TOTAL: 15 PERIODS

TEXT - CUM - REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே. கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணிணித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன்பிரசுரம்)
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம் (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 river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
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23GEE201

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

L T P C
3 0 2 4

OBJECTIVES

- To acquire the knowledge of various curves.
- To learn projections of points, lines, planes viewed in different positions.
- To impart the graphic skills for converting pictorial views of solids into orthographic views and perspective projections.
- To learn the principles of projection of simple solids.
- To gain the knowledge about the section of solids and development of surfaces of the given solids.

UNIT I PLANE CURVES (Manual drafting)

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 (Manual drafting)

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 ORTHOGRAPHIC AND PERSPECTIVE PROJECTIONS (Manual drafting)

9+3

Conversion of isometric projection into orthographic projection. Perspective projection of prisms, pyramids, cones and cylinders by visual ray method.

UNIT IV PROJECTION OF SOLIDS (CAD software)

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 V SECTION OF SIMPLE SOLIDS AND DEVELOPMENT OF SURFACES (CAD software)

9+3

Sectioning of simple solids like prisms – pyramids, cylinder and cone - Inclined to one reference plane. Development of lateral surfaces of simple and truncated solids: Prisms, Pyramids, Cylinders and Cones.

TOTAL: 45+15 = 60 PERIODS

OUTCOMES

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

- Predict the construction of various curves.
- Analyze the principles of projection of various planes by different angle to project points, lines and plane surfaces.
- Draw the projection of three dimensional into two dimensional objects and perspective projections.
- Draw the principles of projection of simple solids by change of position method.





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- Construct the sectional views of components and develop the component surface.

TEXT BOOKS

1. Venugopal K. and Prabhu Raja V., - "Engineering Graphics", Fifteenth Edition, New Age International (P) Limited, 2018.
2. Natarajan K.V., "Engineering Graphics", Thirty Second Edition, Dhanalakshmi Publishers, 2019.
3. Bhatt N.D., "Engineering Drawing", Fifty Third Edition Charotar Publishing House Pvt. Ltd., 2014.

REFERENCES

1. K.R. Gopalakrishna, "Engineering Drawing Volume 1 & 2", Fifty Fifth Edition, Subhas Publications, Bangalore, 2017.
2. T.Jeyapooan., "Engineering Graphics using Auto CAD" Third Edition, vikas publishing house Pvt Ltd, New Delhi, 2017.
3. Dhananjay A. Jolhe, Engineering Drawing with an introduction to AutoCAD, Tata McGraw Hill Publishing Company Limited, 2008.

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	PSO3
1	3	2	2	-	2	2	-	-	-	2	-	2	2	2	2
2	3	2	2	-	2	2	-	-	-	2	-	2	2	2	2
3	3	2	2	-	2	2	-	-	-	2	-	2	2	2	2
4	3	2	2	-	2	2	-	-	-	2	-	2	2	2	2
5	3	2	2	-	2	2	-	-	-	2	-	2	2	2	2
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	3	2	2	-	2	2	-	-	-	2	-	2	2	2	2

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





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23EEE202

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Lab Embedded Theory Course)

LT P C
3 0 2 4

OBJECTIVES

- To understand electric circuit laws, single and three phase circuits, wiring and measuring instruments.
- To know working principles of electrical machines.
- To realize the working principle of various electronic devices and applications.
- To apply the principles of digital electronics in digital world.
- To familiarize the use of various measuring instruments.
- To provide practical knowledge on electrical and electronics engineering

UNIT I ELECTRICAL CIRCUITS

9

DC circuits: Circuit components: Conductor, Resistor, Inductor, Capacitor - Ohm's Law - Kirchhoff's Laws - Independent and Dependent sources - Nodal analysis, Mesh analysis with Independent sources only (Steady state) – Thevenin's theorem – Maximum Power Transfer theorem.

Introduction to AC circuits and parameters: Waveforms, Average value, RMS value, Instantaneous power, real power, reactive power and apparent power, power factor - Steady state analysis of RL, RC & RLC circuits.

UNIT II ELECTRICAL MACHINES

9

DC Generators: Construction and working principle, EMF equation, Types and applications – DC Motors: Working principle, Types and applications - Construction, Working principle and applications: Single phase transformer, Three phase alternator and Three phase induction motor – BLDC Stepper Motor – PMSM.

UNIT III ANALOG ELECTRONICS

9

PN junction diodes and its applications - Zener diode: structure, operation, Zener diode as regulator – Biasing of BJT - JFET, SCR, MOSFET, IGBT - Types, VI characteristics.

UNIT IV DIGITAL ELECTRONICS

9

Review of number systems, binary codes, Combinational logic - Representation of logic functions - SOP and POS forms, K-map representations - Minimization using K maps - Half adder, Full adder – Multiplexer, Demultiplexer.

UNIT V MEASUREMENTS AND INSTRUMENTATION

9

Operating principle and Types of Moving coil and Moving iron meters - Measurement of power and Energy meter - Data acquisition.

LIST OF EXPERIMENTS

1. Verification of KVL & KCL.
2. Load test on DC shunt motor.
3. Characteristics of PN and zener diodes
4. Characteristics of BJT.
5. Half wave and full wave rectifiers
6. Verifications of Half adder and Full adder.
7. Measurement of power and Energy meter.

TOTAL : 45+15 = 60 PERIODS





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OUTCOMES

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

- To understand electric circuits and choose appropriate instruments for electrical measurement for a specific application.
- To understand the concept of different types of DC and AC machines.
- To identify the diode's usage as a rectifier, and Zener diode's usage as an voltage regulator and discuss the basic characteristics of BJT.
- To employ Boolean algebra to implement the combinational logic circuits.
- To understand the operating principles of measuring instruments and choose suitable instrument for measuring the parameters.
- To understand and analyze practical electrical and electronics engineering.

TEXT BOOKS:

1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020.
2. S. K. Bhattacharya "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2017.

REFERENCES:

1. Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019.
2. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2021.

E-RESOURCES:

1. <https://nptel.ac.in/courses/108108076> - (Basics of Electrical Technology).
2. <https://www.digimat.in/nptel/courses/video/108105112/L01.html> -(Fundamentals of Electrical Engineering).

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	3	-	1	-	3	-	-	-	-	2	-	-	-
2	1	-	2	-	1	-	-	-	-	-	-	-	-	-	-
3	2	2	3	1	1	1	-	-	-	-	-	1	-	-	-
4	1	1	2	1	-	-	-	-	-	-	-	-	-	-	-
5	2	1	2	1	3	-	1	-	-	-	-	-	-	-	-
6	2	3	-	2	3	-	-	-	-	-	-	-	-	-	-
AVG	1.6	1.6	2.4	1.25	1.8	1	2	-	-	-	-	1.5	-	-	-

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





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23GEL201

ENGINEERING PRACTICES LABORATORY

LT P C

0042

OBJECTIVES:

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

1. Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in commonhousehold wood work.
2. Wiring various electrical joints in common household electrical wire work.
3. 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.
4. 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 inhousehold appliances.

WOOD WORK:

- a) Sawing,
- b) Planing 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.

PART II ELECTRICAL ENGINEERING PRACTICES

15

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





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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 airconditioner.

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.

ELECTRONIC EQUIPMENT STUDY:

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

TOTAL: 60 PERIODS





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OUTCOMES:

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

- CO1: 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.
- CO2: Wire various electrical joints in common household electrical wire work.
- CO3: 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.
- CO4: 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	PSO3
1	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
2	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
3	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
4	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
5	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
AVG	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1

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





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23EEC201

COMMUNICATION SKILLS

L T P C

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

0 0 4 2

OBJECTIVE

- To use vocabularies appropriately in a sentence and various situations.
- To improve communicative competence through listening.
- To make effective presentations and group discussions.
- To read and recognize different context.
- To write paragraph, essay and special addresses.

Unit I VOCABULARY

6

Vocabulary building – Articulate ideas and thoughts; usage of palindromes, greetings, wishes, festival related words - Vocabulary Words with Sentences. - Idiomatic Expressions.

Unit II LISTENING

6

Listening Skill- Its importance – Purpose - Process - Types- Barriers - Effective Listening strategies- Listening to telephonic conversations – Watching Inspiring Speech videos on Youtube - Listening native speaker's videos for pronunciation - Listening to broadcast, messages, announcements - Listening to Instagram Videos.

Unit III SPEAKING

6

JAM Talk - Role play - Debate - Conversational skills (formal and informal) - Conversation practice - Group Discussion and Interview Skills – Introducing oneself and others – Goal Settings - Immediate, Long term and short term.

Unit IV READING

6

Reading for the Main idea- Finding Specific Information - Reading for Detail - Read and recognize different text types ranging from newspaper, articles, magazines, books and Reading autobiographies.

Unit V WRITING

6

Paragraph Writing - Essay writing - Creative writing - Special Address on Specific topic - Welcome Address, vote of Thanks.

TOTAL: 30 PERIODS

OUTCOMES

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

- Improve vocabulary and express the same contextually.
- Listen and comprehend the general and technical text.
- Speak effectively in presentation, debate and group discussions.
- Read and understand the concept from newspapers, articles, magazines and books.
- Draft special addresses, welcome address, vote of thanks and write paragraph and essay.





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TEXT BOOKS

1. Gramer F. Margot and Colin S. Ward Reading and Writing (Level 3) Oxford University Press: Oxford, 2011
2. Brooks, Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press, Oxford: 2011

REFERENCES

1. Davis, Jason and Rhonda Liss. Effective Academic Writing (Level 3) Oxford University Press: Oxford, 2006
2. E. Suresh Kumar and et al. Enriching Speaking and Writing Skills. Second Edition. Orient Black swan:
3. Anderson, Kenneth et al. Study Speaking: A Course in Spoken English for Academic Purposes. United Kingdom: Cambridge University Press 1992.
4. Technical communication by Asraf rezvi

EXTENSIVE READING

1. Dr. A. P. J. Abdul Kalam " Wings of Fire "

E-RESOURCES

1. <https://youglish.com>
2. <https://newsinlevels.com>
3. <https://britishcouncil.org>
4. <https://writeandimprove.com>

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	-	1	1	1	1	3	-	3	-	-	-
2	-	-	-	-	-	1	-	-	1	3	-	3	-	-	-
3	-	-	-	-	-	1	2	2	3	3	-	3	-	-	-
4	-	-	-	-	-	2	2	-	3	3	-	3	-	-	-
5	-	-	-	-	-	1	1	-	1	3	-	3	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	-	-	-	-	-	1.2	1.5	1.5	1.8	3	-	3	-	-	-

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





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SEMESTER III

23MAT303

DISCRETE MATHEMATICS
[Common to CSE, CSE (CS), IT and AI&DS]

L T P C
3 1 0 4

OBJECTIVES

- To acquaint the knowledge of logic and proofs.
- To learn induction and counting techniques in Combinatorics area.
- To understand the knowledge of graph theory.
- To familiarize the applications of algebraic structures.
- To know the concepts and significance of lattices and Boolean algebra.

UNIT I LOGIC AND PROOFS

9+3

Propositional logic – Propositional equivalences – Predicates and quantifiers – Nested quantifiers – Rules of inference – Introduction to proofs – Normal forms.

.UNIT II INDUCTION AND COUNTING

9+3

Mathematical induction – Strong induction and well-ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Binomial coefficients – Generating functions – Inclusion and exclusion principle

UNIT III GRAPHS

9+3

Graphs and graph models – Graph terminology and special types of graphs – Representing Graphs and Graph Isomorphism – Euler and Hamilton paths – Trees: Introduction to Trees.

UNIT IV ALGEBRAIC STRUCTURES

9+3

Algebraic systems – Semi groups and monoids – Groups: Definitions and examples – Subgroups and homeomorphisms – Cosets and Lagrange's theorem – Normal subgroups – Definitions and examples of Rings and Fields.

UNIT V LATTICES AND BOOLEAN ALGEBRA

9+3

Lattices as partially ordered sets: Definitions and examples – Some properties of lattices – Lattices as algebraic systems – Sub lattices, direct product and homomorphism – Some special lattices – Boolean algebra.

TOTAL : 45+15=60 PERIODS

OUTCOMES

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

- Analyze the concept of logic and proofs.





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- Apply the basic concepts of induction and counting techniques in Combinatorics area.
- Develop the application of graph theory.
- Classify the concepts and properties of algebraic structures such as groups, rings and fields.
- Develop the real-time applications using lattices.

TEXTBOOKS:

1. Kenneth H Rosen, "Discrete Mathematics and its Applications", Seventh Edition, McGraw Hill Education (India) Private Ltd., New Delhi, Special Indian Edition, 2011.
2. Tremblay, J.P. and Manohar.R, " Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, Thirteenth Reprint, 2011.

REFERENCES:

1. Ralph P Grimaldi and B.V Ramana., "Discrete and Combinatorial Mathematics: An Applied Introduction", Fifth Edition, Pearson Education limited, 2014.
2. Satinder Bal Gupta., "Discrete Mathematics and structures ", University science press, New Delhi, Fifth Edition, 2008.

E-RESOURCES

1. <https://nptel.ac.in/courses/106106183> (Discrete Mathematics)
2. <https://nptel.ac.in/courses/106108227> (Discrete Mathematics)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	1	-	-	-	-	-	1	-	-	-	-	-
2	3	3	2	1	-	-	-	-	-	1	-	-	-	-	-
3	3	3	2	1	-	-	-	-	-	1	-	-	-	-	-
4	3	3	2	1	-	-	-	-	-	1	-	-	-	-	-
5	3	3	2	1	-	-	-	-	-	1	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	3	3	2	1	-	-	-	-	-	1	-	-	-	-	-

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





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23ADT301

DATA STRUCTURES DESIGN

LT PC
3 0 0 3

OBJECTIVES

- To understand the concepts of ADTs.
- To Learn linear data structures – lists, stacks, and queues.
- To understand non-linear data structures – trees and graphs.
- To study Tree and Graph structures.
- To understand sorting, searching and hashing algorithms.

UNIT I INTRODUCTION TO ADT

9

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation – singly linked lists – circularly linked lists – doubly linked lists – applications of lists – Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

UNIT II STACKS AND QUEUES

9

Stack ADT – Operations – Applications – Evaluating arithmetic expressions – Conversion of Infix to postfix expression – Queue ADT – Operations – Circular Queue – Priority Queue – deQueue – applications of queues.

UNIT III TREES AND ITS TYPES

9

Tree ADT – tree traversals – Binary Tree ADT – expression trees – applications of trees – binary search tree ADT – Threaded Binary Trees – AVL Trees – B-Tree – B+ Tree – Red-Black trees – Splay trees – Heap – Applications of heap.

UNIT IV GRAPHS AND ITS APPLICATIONS

9

Definition – Representation of Graph – Types of graph – Breadth-first traversal – Depth-first traversal – Topological Sort – Minimum Spanning Trees – Kruskal and Prim algorithm – Shortest path algorithm – Dijkstra's algorithm – Floyd-Warshall algorithm. Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.

UNIT V SEARCHING, SORTING

9

Searching – Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort – Merge sort – Quick sort – Shell sort – Radix sort.

TOTAL : 45 PERIODS





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OUTCOMES

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

- Explain abstract data types.
- Design, implement, and analyse linear data structures, such as lists, queues, and stacks, according to the needs of different applications.
- Design, implement, and analyse efficient tree structures
- Explain the graph problems and implement efficient graph algorithms to solve them
- Design, implement, and analyse the various searching and sorting algorithms

TEXTBOOKS

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education Second Edition, 2005.
2. Kamthane, "Introduction to Data Structures in C", Pearson Education ,first Edition, 2007.

REFERENCES

1. Langsam, Augenstein and Tanenbaum, "Data Structures Using C and C++", Pearson Education ,Second Edition , 2015.
2. Alfred V. Aho, Jeffrey D. Ullman,John E. Hopcroft , "Data Structures and Algorithms", Pearson Education, First edition, 2002.

E-RESOURCES

1. <https://archive.nptel.ac.in/courses/106/106/106106127/>
2. <https://archive.nptel.ac.in/courses/106/102/106102064/>

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	3	1	2	2	1	1	-	1	2	1	3	2	1	3
2	1	2	1	2	2	-	-	-	1	1	1	2	2	2	2
3	2	3	1	2	3	-	-	-	1	1	1	2	2	1	2
4	2	1	-	1	1	-	-	-	2	1	1	2	2	3	1
5	1	2	1	2	2	1	1	-	1	2	1	3	2	2	3
6	2	3	1	2	2	1	1	-	1	2	1	3	2	1	3
AVG	2	2	1	2	2	1	1	0	1	2	1	2	2	1	2

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





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23ADT302

PROGRAMMING USING JAVA

LT P C
3 0 0 3

OBJECTIVES

- To understand Object Oriented Programming concepts and basics of Java programming language
- To know the principles of packages, inheritance and interfaces
- To learn a java application with Exception handles .
- To understand the concepts string handling and input and output streaming.
- To understand the concept of event handling and its uses.

UNIT I INTRODUCTION TO OOP AND JAVA

9

Overview of OOP – Object oriented programming paradigms – Features of Object Oriented Programming – Java Buzzwords – Overview of Java – Data Types, Variables and Arrays – Operators – Control Statements – Programming Structures in Java – Defining classes in Java – Constructors-Methods -Access specifiers - Static members- Java Doc comments

UNIT II INHERITANCE, PACKAGES AND INTERFACES

9

Overloading Methods – Objects as Parameters – Returning Objects –Static, Nested and Inner Classes. Inheritance: Basics– Types of Inheritance -Super keyword -Method Overriding – Dynamic Method Dispatch –Abstract Classes – final with Inheritance. Packages and Interfaces: Packages – Packages and Member Access –Importing Packages – Interfaces

UNIT III EXCEPTION HANDLING

9

Exception fundamentals – uncaught exception – exception types – exception hierarchy- using try and catch – multiple catch blocks – throw, throws, finally – user defined exception

UNIT IV STRING HANDLING AND IO STREAMING

9

String Constructors - String concatenation with other data types – Character Extraction Methods – String Comparison - Modifying a String – Searching String – StringBuffer – Wrapper Classes(Integer, Float, Double, Number, Character, Boolean) - Character Streams and Byte Streams – Reading and Writing Characters and Strings – Reading and Writing Files

UNIT V EVENT HANDLING

9

The Delegation Event Model – Event Classes – Event Listener Interfaces - Layout





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Managers (Flow, Border, Grid and GridBagLayouts) - Handling Mouse Events - Introduction to Swing – JFrame, JTextField, JButton, JTextArea, JComboBox, JTabbedPane, JScrollPane

TOTAL : 45 PERIODS

OUTCOMES

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

- Apply the concepts of classes and objects to solve simple problems
- Develop programs using inheritance, packages and interfaces
- Apply the use of exception handling mechanisms and multithreaded model to solve real world problems
- Analyze Java applications with I/O packages, string classes, Collections and generics concepts
- Design the concepts of event handling and JavaFX components and controls for developing GUI based applications
- Apply the concepts to produce solutions for various problems.

TEXT BOOKS

1. Herbert Schildt, "Java: The Complete Reference", McGraw Hill Education, Eleventh Edition, 2019
2. Herbert Schildt, "Introducing JavaFX 8 Programming", McGraw Hill Education, First Edition, 2015

REFERENCES

1. Cay S. Horstmann, "Core Java Fundamentals", Volume 1, Prentice Hall, Eleventh Edition, 2018
2. Reema Therja, "Programming in C", Oxford University Press, Second Edition, 2016.

E-RESOURCES

1. <https://nptel.ac.in/courses/106/105/106105191/> (Programming in Java)
2. <https://nptel.ac.in/courses/106/105/106105191/> (Inheritance)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	1	3	1	3	-	-	-	3	2	2	2	3	1	2
2	2	1	3	2	1	-	-	-	2	1	1	3	3	3	2
3	3	3	1	2	2	-	-	-	3	2	1	2	3	1	3
4	3	1	2	2	2	-	-	-	1	2	1	3	3	1	1
5	1	1	2	3	2	-	-	-	3	2	1	2	3	3	3
6	1	1	2	3	2	-	-	-	3	2	1	2	3	3	3
AVG	2	1	2	2	2	0	0	0	3	2	1	2	2	1	2

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





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TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU



23ADE301

FOUNDATIONS OF ARTIFICIAL INTELLIGENCE

L T P C
3 0 2 4

OBJECTIVES

- To Understand the various characteristics of intelligent systems.
- To Learn different search methods in Artificial Intelligence.
- To Learn about the concepts of game playing and CSP.
- To Know the different ways of designing software agents.
- To Know about the various applications of AI.
- To Employ AI techniques to solve some of today's real world problems

UNIT I INTELLIGENT AGENTS

9

Introduction to AI – Agents and Environments – concept of rationality – nature of environments – structure of agents. Problem solving agents – search algorithms – uninformed search strategies.

UNIT II PROBLEM SOLVING

9

Heuristic search strategies – heuristic functions. Local search and optimization problems – local search in continuous space – search with non-deterministic actions – search in partially observable environments – online search agents and unknown environments

UNIT III GAME PLAYING AND CSP

9

Game theory – optimal decisions in games – alpha-beta search – monte-carlo tree search – stochastic games . Constraint satisfaction problems – constraint propagation – backtracking search for CSP – local search for CSP – structure of CSP.

UNIT IV LOGICAL REASONING

9

Knowledge-based agents – propositional logic – propositional theorem proving – propositional model checking – agents based on propositional logic. First-order logic – syntax and semantics – knowledge representation and engineering – forward chaining – backward chaining – resolution.

UNIT V APPLICATIONS

9

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot.

TOTAL : 45 PERIODS

OUTCOMES

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

- Explain intelligent agent frameworks
- Apply problem solving techniques
- Apply game playing and CSP techniques
- Perform logical reasoning





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- Develop various applications that use Artificial Intelligence

TEXT BOOKS

1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Fourth Edition, 2020.
2. M. Tim Jones, "Artificial Intelligence: A Systems Approach (Computer Science)", Jones and Bartlett Publishers, Inc. First Edition, 2008.

REFERENCES

1. Gerhard Weiss, "Multi Agent Systems", MIT Press, Second Edition, , 2013.
2. David L. Poole and Alan K. Mackworth, "Artificial Intelligence: Foundations of Computational Agents", Cambridge University Press, First Edition, 2010.

E-RESOURCES

1. <https://nptel.ac.in/courses/106/105/106105077> (Uninformed Search)
2. <https://nptel.ac.in/courses/106/106/106106126> (Propositional and First Order Logic)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	1	3	1	3	-	-	-	3	2	2	2	3	1	2
2	2	1	3	2	1	-	-	-	2	1	1	3	3	3	2
3	3	3	1	2	2	-	-	-	3	2	1	2	3	1	3
4	3	1	2	2	2	-	-	-	1	2	1	3	3	1	1
5	1	1	2	3	2	-	-	-	3	2	1	2	3	3	3
6	3	3	1	2	2	-	-	-	3	2	1	2	3	1	3
Avg	2	2	2	2	2	0	0	0	3	2	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
3 0 2 4

OBJECTIVES

- To understand the basics of algorithmic problem solving.
- To learn the data types, expressions and the statements in python.
- To study the Python functions and function calls to solve problems.
- To learn python data structures-list, tuples, dictionaries to represent complex data.
- To understand the file modules and python packages.
- To practice various computational operations and develop solutions using python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING 9

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

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

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.

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

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





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programs: word count, copy file - Importing Matplotlib – Introduction to plotting – visualizing errors – density and contour plots – Histograms.

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

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

OUTCOMES

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

- Develop algorithmic solutions to solve simple computational problems.
- Develop python programs using expressions to solve the problem.
- Deploy functions and function calls to decompose python programs.





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- Implement solutions using compound data in Python lists, tuples, dictionaries.
- Utilize file modules and python packages for developing applications
- Implement python programs for solving various computational problems

TEXT BOOKS

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	PSO3
1	3	3	3	3	2	-	-	-	-	-	2	2	3	3	-
2	3	3	3	3	2	-	-	-	-	-	2	2	3	-	-
3	3	3	3	3	2	-	-	-	-	-	2	-	3	-	-
4	2	2	-	2	2	-	-	-	-	-	1	-	3	-	-
5	1	2	-	-	1	-	-	-	-	-	1	-	2	-	-
6	2	2	-	-	2	-	-	-	-	-	1	-	2	-	-
AVG	2.33	2.5	1.5	1.83	1.83	-	-	-	-	-	1.5	0.66	2.66	0.5	-

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





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23ECE303

DIGITAL PRINCIPLES AND COMPUTER ARCHITECTURE

L T P C

3 0 2 4

OBJECTIVES

- To learn the Digital fundamentals, Boolean algebra and its applications in digital systems.
- To study with the design of various combinational digital circuits using logic gates.
- To know the design procedures for synchronous and asynchronous sequential circuits.
- To learn the basic structure and registers of a computer.
- To study the memory hierarchies, cache memories and virtual memories.
- To learn practical experience with designing and implementing concepts of micro processor systems using 8085 micro processor.

UNIT I INTRODUCTION TO DIGITAL CIRCUITS

9

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes – Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map Minimization and Quine-McCluskey method of minimization.

UNIT II COMBINATIONAL CIRCUITS

9

Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Multiplexer, Demultiplexer, Magnitude Comparator, Decoder, Encoder, Priority Encoder.

UNIT III SEQUENTIAL CIRCUITS

9

Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, Triggering of FF, Analysis and design of synchronous & asynchronous circuits – Design Moore/Mealy models, state minimization, state assignment, circuit implementation – Design of Counters- Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.

UNIT IV COMPUTER ARCHITECTURE AND REGISTERS

9

Basics of a computer system: Evolution, Ideas, Technology, Performance, Power wall, Uniprocessors to Multiprocessors. Addressing and addressing modes. Instructions: Operations and Operands, Representing instructions, Logical operations, control operations.





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UNIT V MEMORY AND I/O ORGANIZATION

9

Memory hierarchy, Memory Chip Organization, Cache memory, Virtual memory. Parallel Bus Architectures, Internal Communication Methodologies, Serial Bus Architectures, Mass storage, Input and Output Devices.

LIST OF EXPERIMENTS

DIGITAL CIRCUITS

1. Verification of Boolean theorems using digital logic gates.
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters, etc.
3. Design and implementation of 4-bit binary adder / subtractor using basic gates.
4. Design and implementation of parity generator / checker, magnitude comparator using basic gates and MSI devices.
5. Design and implementation of application using multiplexers/ Demultiplexers.
6. Design and implementation of Shift registers, Synchronous and Asynchronous counters.

COMPUTER ARCHITECTURE

1. Write a program using 8085 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers.
2. Write a program to arrange an array of data in ascending and descending order.
3. Find the largest and smallest number in an array of data using 8085 instruction set.
4. Write a simple Interrupt service routine to understand interrupt.

TOTAL:45+15= 60 PERIODS

OUTCOMES

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

- Develop real time applications through digital fundamentals.
- Design various combinational digital circuits using logic gates.
- Analyze and design procedures for synchronous and asynchronous sequential circuits.
- Apply the basics of computers, operations and instructions with design of arithmetic and logic unit.
- Discuss the various memory systems and bus architectures.
- Analyze the Digital circuits and 8085 microprocessors instruction set.





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TEXT BOOKS

1. M. Morris Mano and Michael D. Ciletti, "Digital Design", Pearson, Fifth Edition, 2014.
2. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software Interface", Morgan Kaufmann / Elsevier, Fifth Edition, 2014.

REFERENCES

1. S.Salivahanan and S.Arivazhagan, "Digital Electronics", Vikas Publishing House pvt Ltd ,First Edition, 2012.
2. John P. Hayes, "Computer Architecture and Organization", Tata McGraw Hill, Third Edition, 2012.

E-RESOURCES

1. <https://nptel.ac.in/courses/108105132> (Digital electronics)
2. <https://nptel.ac.in/courses/106102062> (Computer Architecture)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	2	2	2	2	-	-	-	-	3	3	3	3	2
2	3	2	2	3	2	2	-	-	-	-	2	1	2	3	2
3	3	3	3	2	1	2	-	-	-	-	2	2	3	2	2
4	3	3	2	3	2	2	-	-	-	-	3	2	2	3	1
5	3	2	3	2	2	1	-	-	-	-	2	2	3	3	2
6	3	2	1	3	2	2	-	-	-	-	2	3	2	2	2
AVG	3	2	2	3	2	2	-	-	-	-	2	2	3	3	2

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





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SEMESTER IV

23ADT401

COMPUTER NETWORKING

L T P C

3 0 0 3

OBJECTIVES

- To understand the protocol layering and physical level communication
- To learn the functions of network layer
- To learn the functions of the various routing protocols
- To learn the functions and protocols of the Transport layer.
- To understand the concept of layering in networks.

UNIT I DATA LINK AND PHYSICAL LAYERS

9

Data Link Layer – Framing – Flow control – Error control – Data-Link Layer Protocols – HDLC – PPP - Media Access Control – Ethernet Basics – CSMA/CD – Virtual LAN – Wireless LAN (802.11) - Physical Layer: Data and Signals - Performance – Transmission media- Switching – Circuit Switching

UNIT II NETWORK LAYER

9

Switching : Packet Switching - Internet protocol - IPV4 – IP Addressing – Subnetting - IPV6, ARP, RARP, ICMP, DHCP

UNIT III ROUTING

9

Routing and protocols: Unicast routing - Distance Vector Routing - RIP - Link State Routing – OSPF – Path-vector routing - BGP - Multicast Routing: DVMRP – PIM

UNIT IV TRANSPORT LAYER

9

Introduction - Transport-Layer Protocols: UDP – TCP: Connection Management – Flow control - Congestion Control - Congestion avoidance (DECbit, RED) – SCTP – Quality of Service

UNIT V INTRODUCTION AND APPLICATION LAYER

9

Data Communication - Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Introduction to Sockets - Application Layer protocols: HTTP – FTP – Email protocols (SMTP - POP3 - IMAP - MIME) – DNS – SNMP

TOTAL: 45 PERIODS

OUTCOMES

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

- Explain the basic layers and its functions in computer networks
- Describe protocols for various functions in the network.
- Analyze routing algorithms





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- Explain the basics of how data flows from one node to another.
- Analyze the working of various application layer protocols

TEXT BOOKS

1. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Pearson Education ,Eighth Edition, , 2021.
2. Behrouz A. Forouzan, "Data Communications and Networking with TCP/IP Protocol Suite", TMH ,Sixth Edition, 2022.

REFERENCES

1. Larry L. Peterson, Bruce S. Davie," Computer Networks: A Systems Approach", Morgan Kaufmann Publishers Inc., Fifth Edition, 2012.
2. William Stallings, "Data and Computer Communications", Pearson Education Tenth Edition, 2013

E-RESOURCES

1. <https://nptel.ac.in/courses/106/106/106106091/> (Introduction to Computer Networks)
2. <https://nptel.ac.in/courses/106/105/106105082/> (Computer Networks)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	2	3	-		-	-	1	1	3	1	3	2	1
2	2	2	1	2	2		-	-	2	2	2	1	3	2	3
3	2	3	3	2	1		-	-	3	3	1	2	1	1	3
4	1	3	1	3	1		-	-	1	2	1	1	1	3	1
5	3	3	1	1	2		-	-	2	2	2	2	2	2	2
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2	2	1	2	1	0	0	0	2	2	2	1	2	2	2

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





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23ITT401

OBJECT ORIENTED SOFTWARE DESIGN

L T P C
3 0 0 3

OBJECTIVES

- To understand the fundamentals of Software Engineering concepts.
- To study about the Requirement analysis and different Modelling Diagrams
- To know Design Patterns and Testing Methodology
- To learn the OO Basics and the case diagrams.
- To know the Impact of object orientation Test Cases and Test Plans

UNIT I INTRODUCTION

9

Software engineering concepts – Development activities – Software lifecycle models - Classical waterfall - Iterative waterfall – Prototyping – Evolutionary - Spiral – Software project management – Project planning – Estimation – Scheduling – Risk management – Software configuration management

UNIT II SOFTWARE REQUIREMENT SPECIFICATION

9

Requirement analysis and specification – Requirements gathering and analysis – Software Requirement Specification – Formal system specification – Finite State Machines – Petrinets – Object modelling using UML – Use case Model – Class diagrams – Interaction diagrams – Activity diagrams – State chart diagrams – Functional modelling – Data Flow Diagram.

UNIT III DESIGN, TESTING & MAINTENANCE

9

Software design – Design process – Design concepts – Coupling – Cohesion – Functional independence – Design patterns – Testing – Unit testing – Black box testing– White box testing – Integration and System testing– Regression testing – Debugging - Program analysis – Symbolic execution – Model Checking-Maintenance and Reengineering-BPR model Reengineering process model-Reverse and Forward Engineering.

UNIT IV UNIFIED PROCESS AND USE CASE DIAGRAMS

9

Introduction to OOAD with OO Basics — Unified Process — UML diagrams — Use Case – Case study — the Next Gen POS system, Inception -Use case Modelling — Relating Use cases — include, extend and generalization — When to use Use-cases - Class Diagram- Aggregation and Composition — Relationship between sequence diagrams and use cases

UNIT V DESIGN PATTERNS & TESTING

9

GRASP: Designing objects with responsibilities — Creator — Information expert — Low Coupling — High Cohesion — Controller Design Patterns — creational — factory method —





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structural — Bridge - Adapter — behavioural — Strategy — observer –Applying GoF design patterns — Mapping design to code-object Oriented Methodologies — Software Quality Assurance — Impact of object orientation on Testing — Develop Test Cases and Test Plans

TOTAL: 45 PERIODS

OUTCOMES

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

- Express software life cycle models with software models
- Identify various scenarios based on software requirements.
- Transform software design into pattern based design using design patterns
- Analyze the OO concepts using UML diagrams
- Identify various Patterns & Methodologies for Software Quality Assurance

TEXT BOOKS

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Pearson Education ,Third Edition, 2005.
2. Bernd Bruegge, Alan H Dutoit, "Object-Oriented Software Engineering", Pearson Education, Second edition, , 2004.
3. Len Bass, Ingo Weber and Liming Zhu," DevOps: A Software Architect's Perspective", Pearson Education, 2016

REFERENCES

1. Rajib Mall," Fundamentals of Software Engineering", PHI Learning Pvt. Ltd., Third edition, 2009.
2. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Addison Wesley, Third edition, 2003.

E-RESOURCES

1. <https://nptel.ac.in/courses/106/105/106105182> (Software Models)
2. https://onlinecourses.nptel.ac.in/noc20_cs84/preview (OO models)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	3	3	-				1	3	3	3	1	2	2
2	1	1	1	3	1				1	2	1	3	2	3	2
3	2	1	2	1	1				2	1	1	3	1	1	1
4	3	1	3	1	-				2	1	2	1	2	2	2
5	3	1	1	2	2				3	1	2	3	2	1	2
6	3	1	1	2	2				3	1	2	3	2	1	2
AVG	2.5	1.6	1.8	2	1				2	1.5	1.8	2.6	1.6	1.6	1.8

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





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23CST302

OPERATING SYSTEMS

L T P C
3 0 0 3

OBJECTIVES

- To learn the basics and functions of operating systems
- To study the scheduling algorithms and process synchronization
- To understand the concept of memory management and segmentation
- To understand the storage management system
- To study the basics of virtual machines and Mobile OS

UNIT I INTRODUCTION

9

Computer System – Elements and organization; Operating System Overview – Objectives and Functions – Evolution of Operating System; Operating System Structures – Operating System Services – User Operating System Interface – System Calls – System Programs – Design and Implementation – Structuring methods

UNIT II PROCESS MANAGEMENT

9

Processes – Process Concept – Process Scheduling – Operations on Processes – Inter-process Communication; CPU Scheduling – Scheduling criteria – Scheduling algorithms: Threads – Multithread Models – Threading issues; Process Synchronization – The Critical-Section problem – Synchronization hardware – Semaphores – Mutex – Classical problems of synchronization – Monitors; Deadlock – Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

UNIT III MEMORY MANAGEMENT

9

Main Memory – Swapping – Contiguous Memory Allocation – Paging – Structure of the Page Table – Segmentation, Segmentation with paging; Virtual Memory – Demand Paging – Copy on Write – Page Replacement – Allocation of Frames –Thrashing.

UNIT IV STORAGE MANAGEMENT

9

Mass Storage system – Disk Structure – Disk Scheduling and Management; File-System Interface – File concept – Access methods – Directory Structure – Directory organization – File system mounting – File Sharing and Protection; File System Implementation – File System Structure – Directory implementation – Allocation Methods – Free Space Management; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem

UNIT V VIRTUAL MACHINES AND MOBILE OS

9

Virtual Machines – History, Benefits and Features, Building Blocks, Types of Virtual Machines and their Implementations, Virtualization and Operating-System Components; Mobile OS – iOS and Android

TOTAL: 45 PERIODS





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OUTCOMES

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

- Acquire knowledge about basics and functions of operating systems.
- Analyze various scheduling algorithms and process synchronization.
- Compare and contrast various memory management schemes.
- Describe the functionality of file systems, I/O systems, and Virtualization
- Apply Virtualization and compare iOS and Android Operating Systems.

TEXT BOOKS

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley and Sons Inc., Tenth Edition, 2018
2. Andrew S Tanenbaum, "Modern Operating Systems", Pearson, Fifth Edition, 2022

REFERENCES

1. Ramaz Elmasri, A. Gil Carrick, David Levine, " Operating Systems – A Spiral Approach", Tata McGraw Hill Edition, 2010
2. William Stallings, "Operating Systems: Internals and Design Principles", Prentice Hall, Seventh Edition, 2018.

E-RESOURCES

1. <https://nptel.ac.in/courses/106105214>(Operating system fundamentals)
2. <https://nptel.ac.in/courses/106106144>(Introduction to operating systems)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	2	2	-	-	-	-	-	3	2	3	1	1	2
2	2	2	3	1	-	-	-	-	-	2	2	2	3	1	2
3	1	3	2	2	-	-	-	-	-	2	2	1	1	1	1
4	1	3	3	3	-	-	-	-	-	3	2	3	2	3	1
5	3	1	2	2	-	-	-	-	-	3	3	2	2	1	3
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2	2	2	1	-	-	-	-	-	2	2	2	2	1	2

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





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23ADE401

DATA SCIENCE AND ANALYTICS
(Lab Embedded Theory Course)

L T P C
3 0 2 4

OBJECTIVES

- To understand the techniques and processes of data science
- To understand skills in data preparatory and preprocessing steps
- To understand the mathematical skills in statistics
- To understand inferential data analytics
- To analysis and build predictive models from data
- To provide a practical knowledge about various data analytics

UNIT I INTRODUCTION

9

Need for data science – benefits and uses – facets of data – data science process – setting the research goal – retrieving data – cleansing, integrating, and transforming data – exploratory data analysis – build the models – presenting and building applications.

UNIT II PROCESS MANAGEMENT

9

Normal distributions – z scores – normal curve problems – finding proportions – finding scores – more about z scores – correlation – scatter plots – correlation coefficient for quantitative data – computational formula for correlation coefficient – regression – regression line – least squares regression line – standard error of estimate – interpretation of r^2 – multiple regression equations – regression toward the mean .

UNIT III INFERENCE STATISTICS

9

Populations – samples – random sampling – probability and statistics Sampling distribution – creating a sampling distribution – mean of all sample means – standard error of the mean – other sampling distributions Hypothesis testing – z-test – z-test procedure – statement of the problem – null hypothesis – alternate hypotheses – decision rule – calculations – decisions - interpretations .

UNIT IV T-TEST

9

t-test for one sample – sampling distribution of t – t-test procedure – degrees of freedom – estimating the standard error – case studies t-test for two independent samples – statistical hypotheses – sampling distribution – test procedure – p-value – statistical significance – estimating effect size – t-test for two related samples





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UNIT V ANALYSIS OF VARIANCE

9

F-test – ANOVA – estimating effect size – multiple comparisons – case studies Analysis of variance with repeated measures Two-factor experiments – three f-tests – two-factor ANOVA – other types of ANOVA Introduction to chi-square tests

LIST OF EXPERIMENTS

(Any Eight Experiments to be Conducted)

Tools: Python, Numpy, Scipy, Matplotlib, Pandas, statmodels, seaborn, plotly, bokeh

1. Working with Numpy arrays
2. Working with Pandas data frames
3. Basic plots using Matplotlib
4. Frequency distributions, Averages, Variability
5. Normal curves
6. Correlation and scatter plots
7. Correlation coefficient
8. Regression
9. Z-test case study
10. T-test case studies

TOTAL: 45+15=60 PERIODS

OUTCOMES

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

- Explain the data analytics pipeline
- Represent the useful information using mathematical skills
- Perform statistical inferences from data
- Analyze the variance in the data
- Build models for predictive analytics
- Develop various applications that use Artificial Intelligence and Data Science

TEXT BOOKS

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016. (first two chapters for Unit I).
2. Robert S. Witte and John S. Witte, "Statistics", Wiley Publications, Eleventh Edition, 2017.





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REFERENCES

1. Allen B. Downey, "Think Stats: Exploratory Data Analysis in Python", Green Tea Press, 2014.
2. Sanjeev J. Wagh, Manisha S. Bhende, Anuradha D. Thakare, "Fundamentals of Data Science", CRC Press, 2022.

E-RESOURCES

1. <https://nptel.ac.in/courses/108/105/106105219/> (Introduction data science)
2. <https://nptel.ac.in/courses/108/102/106102132/> (time series)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	1	3	1	3	-	-	-	3	2	2	2	3	1	2
2	2	1	3	2	1	-	-	-	2	1	1	3	3	3	2
3	3	3	1	2	2	-	-	-	3	2	1	2	3	1	3
4	3	1	2	2	2	-	-	-	1	2	1	3	3	1	1
5	1	1	2	3	2	-	-	-	3	2	1	2	3	3	3
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2	1	2	2	2	0	0	0	2	2	1	2	3	2	2

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





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23ADE402

MACHINE LEARNING ESSENTIALS (Lab Embedded Theory Course)

L T P C
3 0 2 4

OBJECTIVES

- To understand the basic concepts of machine learning.
- To understand and build supervised learning models.
- To understand and build unsupervised learning models.
- To understand the algorithms based on corresponding metrics identified
- To understand Reinforcement Learning
- To Implement and demonstrate the algorithms to output a description of the set data

UNIT I MACHINE LEARNING BASICS

9

Review of Linear Algebra for machine learning; Introduction and motivation for machine learning; Examples of machine learning applications, Vapnik-Chervonenkis (VC) dimension, Probably Approximately Correct (PAC) learning, Hypothesis spaces, Inductive bias, Generalization, Bias variance trade-off

UNIT II SUPERVISED LEARNING

9

Linear Regression Models: Least squares, single & multiple variables, Bayesian linear regression, gradient descent, Linear Classification Models: Discriminant function – Perceptron algorithm, Probabilistic discriminative model– Naive Bayes, Maximum margin classifier – Support vector machine, Decision Tree, Random Forests

UNIT III UNSUPERVISED LEARNING

9

Combining multiple learners: Model combination schemes, Voting, Ensemble Learning - bagging, boosting, stacking, Unsupervised learning: K-means, Instance Based Learning: KNN, Gaussian mixture models and Expectation maximization.

UNIT IV DESIGN AND ANALYSIS OF MACHINE LEARNING EXPERIMENTS

9

Guidelines for machine learning experiments, Cross Validation (CV) and resampling – K-fold CV, bootstrapping, measuring classifier performance, assessing a single classification algorithm and comparing two classification algorithms – t test, McNemar's test, K-fold CV paired t test

UNIT V REINFORCEMENT LEARNING

9

Introduction, Learning Task, Q Learning, Non deterministic Rewards and actions, temporal-difference learning, Relationship to Dynamic Programming, Active reinforcement learning,





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Generalization in reinforcement learning

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
2. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
3. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
4. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file and compute the accuracy with a few test data sets.
5. Implement naïve Bayesian Classifier model to classify a set of documents and measure the accuracy, precision, and recall.
6. Write a program to construct a Bayesian network to diagnose CORONA infection using standard WHO Data Set.
7. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using the k-Means algorithm. Compare the results of these two algorithms.
8. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions.

TOTAL: 45+15= 60 PERIODS

OUTCOMES

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

- Explain the basic concepts of machine learning.
- Construct supervised learning models.
- Construct unsupervised learning algorithms.
- Evaluate and compare different models
- Identify and integrate more than one techniques to enhance the performance of learning
- Construct k-Nearest Neighbour algorithm.





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TEXT BOOKS

1. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Fourth Edition, 2020.
2. Stephen Marsland, "Machine Learning: An Algorithmic Perspective ", CRC Press, Second Edition, 2014.

REFERENCES

1. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2006.
2. Tom Mitchell, "Machine Learning", McGraw Hill, Third Edition, 2007.

E-RESOURCES

1. <https://nptel.ac.in/courses/106/105/106105152/> (Different Types of Learning)
2. <https://nptel.ac.in/courses/106/106/106106202/> (Learning Problem)

Mapping of Cos-Pos & PSOs

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1	3	3	3	3	2	-	-	-	-	-	2	2	3	3	-
2	3	3	3	3	2	-	-	-	-	-	2	2	3	-	-
3	3	3	3	3	2	-	-	-	-	-	2	-	3	-	-
4	2	2	-	2	2	-	-	-	-	-	1	-	3	-	-
5	1	2	-	-	1	-	-	-	-	-	1	-	2	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2	2	2	2	2	0	0	0	0	0	1	1	2	1	0

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





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23CSE402

DATABASE MANAGEMENT SYSTEMS (Lab Embedded Theory Course)

L T P C
3 0 2 4

OBJECTIVES

- To study the fundamentals of data models, relational algebra and SQL.
- To understand the database system using ER diagrams and to learn normalization techniques.
- To know the fundamental concepts of transaction processing– concurrency control techniques and recovery procedures.
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To learn the Storage and Query processing Techniques.
- To provide a practical knowledge about various commands and procedures in a RDBMS.

UNIT I RELATIONAL DATABASES

10

Introduction : Database System Application – Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Embedded SQL – Dynamic SQL

UNIT II DATABASE DESIGN

9

Entity-Relationship model – E-R Diagrams – Enhanced E-R Model – ER Design Issues – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

UNIT III TRANSACTIONS

9

Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery – Save Points – SQL Facilities for Concurrency and Recovery.

UNIT IV IMPLEMENTATION TECHNIQUES

9

Overview of Physical Storage Media – Magnetic Disks – RAID – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B+ tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Measure the Cost Estimation.





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UNIT V ADVANCED TOPICS

9

Distributed Databases: Architecture, Data Storage, Transaction Processing – Object-based Databases: Object Database Concepts, Object-Relational features – XML Databases: XML Hierarchical Model, purpose of XML – Information Retrieval: IR Concepts and Advantages.

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements.
2. Implement Relational model to entitle ann strong and weak entities.
3. Database Querying – Simple queries, Nested queries, Sub queries and Joins.
4. Views, Sequences, Synonyms.
5. Database Programming: Implicit and Explicit Cursors.
6. Procedures and Functions.
7. Triggers.
8. Exception Handling.
9. Database Design using ER modelling, normalization and Implementation for any application.
10. Database Connectivity with Front End Tools.
11. Case Study using real life database applications.

TOTAL : 45+15 = 60 PERIODS

OUTCOMES

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

- Construct SQL queries using relational algebra.
- Design database using ER model and normalize the database.
- Construct queries to handle transaction processing and maintain consistency of the database.
- Compare and contrast various indexing strategies and apply the knowledge to tune the performance of the database.
- Appraise how advanced databases differ from relational databases.
- Gather a practical knowledge about various commands and procedures in a RDBMS.





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TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Tata McGraw Hill, Sixth Edition, 2011.
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Pearson Education, Sixth Edition, 2011.

REFERENCES

1. C.J. Date, A. Kannan, S. Swamynathan, "An Introduction to Database Systems", Pearson Education, Eight Edition, 2006.
2. Raghu Ramakrishnan, "Database Management Systems", McGraw-Hill College Publications, Fourth Edition, 2015.

E-RESOURCES

1. <https://nptel.ac.in/courses/106/105/106105175/> (Introduction to DBMS)
2. <https://nptel.ac.in/courses/106/106/106106093/> (Conceptual Designs)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	2	3	2	1	-	-	-	2	1	1	1	2	1	3
2	3	1	1	2	1	-	-	-	2	3	3	3	1	1	2
3	3	2	3	2	1	-	-	-	2	1	1	2	3	3	3
4	1	2	3	2	-	-	-	-	3	2	3	3	2	2	3
5	1	1	3	3	2	-	-	-	1	3	3	1	2	2	2
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2	2	3	2	1	-	-	-	2	2	2	2	2	2	3

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





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MINOR DEGREE / HONOURS





CURRICULUM AND SYLLABI

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

(MINOR/HONOURS DEGREE – FULL STACK DEVELOPMENT)

B.Tech. – ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23ADFT01	Client-Server Scripting Languages	PC	3	0	0	3	40	60	100
23ADFT02	UI and UX Design	PC	3	0	0	3	40	60	100
23ADFT03	Software Testing and Automation	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23ADFE01	Cloud Computing Services	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23ADFP01	Project Work	EEC	0	0	12	6	40	60	100
Total Credits						19			

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





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SEMESTER - III

23ADFT01

CLIENT-SERVER SCRIPTING LANGUAGES

L T P C

3 0 0 3

OBJECTIVES

- To understand the fundamental principles of web development.
- To learn about to handle HTTP requests and responses on the server-side.
- To learn how to use AJAX, RESTful API and JSON concepts.
- To study about Implementation of user registration and login functionality.
- To understand and implement security best practices for web applications to prevent common vulnerabilities.

UNIT I INTRODUCTION TO WEB DEVELOPMENT AND CLIENT-SIDE SCRIPTING 9

Introduction to web development principles, Overview of client-server architecture, Setting up the development environment, Basics of HTML, CSS, and JavaScript, DOM manipulation and event handling.

UNIT II SERVER-SIDE SCRIPTING FUNDAMENTALS 9

Introduction to server-side scripting languages (e.g., PHP, Node.js, Python, or Ruby), Handling HTTP requests and responses, Working with server-side databases, Implementing basic server-side logic.

UNIT III COMMUNICATION BETWEEN CLIENT AND SERVER 9

AJAX (Asynchronous JavaScript and XML) for client-server communication, RESTful API concepts and implementation, Data exchange between client and server, JSON (JavaScript Object Notation) and its usage.

UNIT IV DATA STORAGE AND USER MANAGEMENT 9

Introduction to databases (e.g., MySQL, MongoDB, or PostgreSQL), CRUD operations using server-side scripting languages, Implementing user registration and login functionality, User authentication and authorization.

UNIT V ADVANCED TOPICS AND PROJECT DEVELOPMENT 9

Front-end frameworks (e.g., React, Angular, or Vue.js) and integrating them with server-side scripts, Server-side templating and generating dynamic content, Security best practices for web applications, Deployment and hosting options for web applications, Final project development: Students work on a comprehensive web application that demonstrates the





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skills learned throughout the course.

TOTAL : 45 PERIODS

OUTCOMES

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

- Explain the web development principles and the client-server architecture.
- Create server-side databases and implement basic server-side logic to process data and generate dynamic content.
- Explain about AJAX (Asynchronous JavaScript and XML), concepts of RESTful APIs and JSON (JavaScript Object Notation).
- Develop user registration and login functionality with user authentication and authorization features.
- Describe about deployment and hosting options for web applications.

TEXT BOOKS

1. David Flanagan, O'Reilly Media, "JavaScript: The Definitive Guide", Inc. Publications, Seventh Edition, 2020.
2. Mario Casciaro and Luciano Mammino, "Node.js Design Patterns", Packet Publishing Limited Publications, 2020.

REFERENCES

1. Miguel Grinberg , " Flask Web Development: Developing Web Applications with Python", Shroff/O'Reilly Publications, Second Edition, 2018.
2. Eve Porcello, Alex Banks, "Learning React: Modern Patterns for Developing React Apps", O'Reilly Publications, Second Edition, 2020.

E-RESOURCES

1. <https://developer.mozilla.org/en-US/docs/Web/JavaScript> (MDN Web Docs - JavaScript)
2. <https://nodejs.org/en/docs/> (Node.js Official Documentation)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	3	-	1	-	3	-	-	-	-	2	-	-	-
2	1	-	2	-	1	-	-	-	-	-	-	-	-	-	-
3	2	2	3	1	1	1	-	-	-	-	-	1	-	-	-
4	1	1	2	1	-	-	-	-	-	-	-	-	-	-	-
5	2	1	2	1	3	-	1	-	-	-	-	-	-	-	-
6	2	3	-	2	3	-	-	-	-	-	-	-	-	-	-
AVG	1.6	1.6	2.4	1.25	1.8	1	2	-	-	-	-	1.5	-	-	-

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





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SEMESTER IV

23ADFT02

UI AND UX DESIGN

L T P C

3 0 0 3

OBJECTIVES

- To understand the fundamental concepts of design and design thinking
- To learn the principles and elements of UI design
- To understand the concept of User Experience (UX) and its significance in the success of products and services
- To learn with practical skills in creating wireflows and prototypes to test and validate design ideas before implementation
- To study various research and ideation techniques and create a solid information architecture for products

UNIT I FOUNDATIONS OF DESIGN

9

UI vs. UX Design - Core Stages of Design Thinking - Divergent and Convergent Thinking - Brainstorming and Game storming - Observational Empathy

UNIT II FOUNDATIONS OF UI DESIGN

9

Visual and UI Principles - UI Elements and Patterns - Interaction Behaviors and Principles – Branding - Style Guides

UNIT III FOUNDATIONS OF UX DESIGN

9

Introduction to User Experience - Why You Should Care about User Experience - Understanding User Experience - Defining the UX Design Process and its Methodology - Research in User Experience Design - Tools and Method used for Research - User Needs and its Goals - Know about Business Goals

UNIT IV WIREFRAMING, PROTOTYPING AND TESTING

9

Sketching Principles - Sketching Red Routes - Responsive Design – Wireframing - Creating Wireflows - Building a Prototype - Building High-Fidelity Mockups - Designing Efficiently with Tools - Interaction Patterns - Conducting Usability Tests - Other Evaluative User Research Methods - Synthesizing Test Findings - Prototype Iteration

UNIT V RESEARCH, DESIGNING, IDEATING, & INFORMATION ARCHITECTURE

9

Identifying and Writing Problem Statements - Identifying Appropriate Research Methods - Creating Personas - Solution Ideation - Creating User Stories - Creating Scenarios - Flow





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Diagrams - Flow Mapping - Information Architecture

TOTAL: 45 PERIODS

OUTCOMES

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

- Explain problem statements to guide their design process
- Analyze and evaluate existing interfaces based on visual and UI principles, identifying strengths and areas for improvement
- Develop a comprehensive understanding of the key components that constitute User Experience
- Create Wireframe, Prototype and Testing
- Identify and write clear problem statements to address user needs effectively

TEXT BOOKS

1. Joel Marsh, "UX for Beginners", O'Reilly , 2022
2. Jon Yablonski, "Laws of UX using Psychology to Design Better Product & Services", O'Reilly, 2021

REFERENCES

1. Jenifer Tidwell, Charles Brewer, Aynne Valencia, "Designing Interface", O'Reilly, Third Edition, 2020
2. Steve Schoger, Adam Wathan "Refactoring UI", 2018

E-RESOURCES

1. <https://www.nngroup.com/articles/>
2. <https://www.interaction-design.org/literature>

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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3	1	3	3	2	2	-	-	-	2	3	1	2	1	3	3
4	1	2	3	3	1	-	-	-	3	2	1	3	3	3	3
5	1	2	3	2	1	-	-	-	2	1	1	1	3	2	2
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	1.6	2.2	2.2	2.6	1.4	-	-	-	2.2	2.2	1.4	1.8	2.2	2.6	2.2

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





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23ADFT03

SEMESTER V SOFTWARE TESTING AND AUTOMATION

L T P C
3 0 0 3

OBJECTIVES

- To understand the importance of software testing and its role in software development
- To learn how to do the testing and planning effectively
- To understand various factors influencing test design
- To learn different types of performance testing
- To study the concept of automated software testing and its benefits

UNIT I FOUNDATIONS OF SOFTWARE TESTING 9

Why do we test Software?, Black-Box Testing and White-Box Testing, Software Testing Life Cycle, V-model of Software Testing, Program Correctness and Verification, Reliability versus Safety, Failures, Errors and Faults (Defects), Software Testing Principles, Program Inspections, Stages of Testing: Unit Testing, Integration Testing, System Testing

UNIT II TEST PLANNING 9

The Goal of Test Planning, High Level Expectations, Intergroup Responsibilities, Test Phases, Test Strategy, Resource Requirements, Tester Assignments, Test Schedule, Test Cases, Bug Reporting, Metrics and Statistics.

UNIT III TEST DESIGN AND EXECUTION 9

Test Objective Identification, Test Design Factors, Requirement identification, Testable Requirements, Modeling a Test Design Process, Modeling Test Results, Boundary Value Testing, Equivalence Class Testing, Path Testing, Data Flow Testing, Test Design Preparedness Metrics, Test Case Design Effectiveness, Model-Driven Test Design, Test Procedures, Test Case Organization and Tracking, Bug Reporting, Bug Life Cycle.

UNIT IV ADVANCED TESTING CONCEPTS 9

Performance Testing: Load Testing, Stress Testing, Volume Testing, Fail-Over Testing, Recovery Testing, Configuration Testing, Compatibility Testing, Usability Testing, Testing the Documentation, Security testing, Testing in the Agile Environment, Testing Web and Mobile Applications.

UNIT V TEST AUTOMATION AND TOOLS 9

Automated Software Testing, Automate Testing of Web Applications, Selenium: Introducing





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Web Driver and Web Elements, Locating Web Elements, Actions on Web Elements, Different Web Drivers, Understanding Web Driver Events, Testing: Understanding Testing.xml, Adding Classes, Packages, Methods to Test, Test Reports.

TOTAL: 45 PERIODS

OUTCOMES

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

- Apply Black-Box and White-Box Testing techniques based on different testing scenarios
- Explain and understand the purpose and significance of test planning in software development
- Develop clear and concise test procedures and organize test cases for efficient execution
- Explain and conduct Load Testing, Stress Testing, Volume Testing, Fail-Over Testing, Recovery Testing, and Configuration Testing as per project requirements
- Demonstrate the advantages and use cases of test automation in software testing

TEXT BOOKS

1. Yogesh Singh, "Software Testing", Cambridge University Press, 2012.
2. Unmesh Gundecha, Satya Avasarala, "Selenium WebDriver 3 Practical Guide" - Second Edition 2018.

REFERENCES

1. Glenford J. Myers, Corey Sandler, Tom Badgett, "The Art of Software Testing", John Wiley & Sons, Inc, Third Edition, 2012.
2. Ron Patton, "Software testing", Sams Publishing, Second Edition, 2006.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc22_cs61/preview (Programming, Algorithms, Discrete Mathematics (basics))
2. https://onlinecourses.nptel.ac.in/noc23_cs38/preview (Basic Knowledge of Programming)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	2	1	2	-	-	-	1	1	3	2	3	2	3
2	2	3	1	1	1	-	-	-	2	2	1	2	1	2	3
3	2	2	1	3	1	-	-	-	1	3	1	2	2	3	2
4	2	1	3	2	1	-	-	-	1	1	1	2	3	1	2
5	2	2	1	3	1	-	-	-	1	3	2	1	2	1	3
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.2	2.2	1.6	2	1.2	-	-	-	1.2	2	1.6	1.8	2.2	1.8	2.6

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





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SEMESTER VI

23ADFE01

CLOUD COMPUTING SERVICES

L T P C

3 0 2 4

OBJECTIVES

- To understand the principles of cloud architecture, models and infrastructure.
- To know the concepts of virtualization and virtual machines.
- To learn knowledge about virtualization Infrastructure
- To study and experiment with various Cloud deployment environments
- To learn about the security issues in the cloud environment
- To understand to monitor and manage cloud performance to ensure optimal service delivery and resource utilization

UNIT I CLOUD ARCHITECTURE MODELS AND INFRASTRUCTURE 9

Cloud Architecture: System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture – Cloud deployment models – Cloud service models; Cloud Infrastructure: Architectural Design of Compute and Storage Clouds – Design Challenges

UNIT II VIRTUALIZATION BASICS 9

Virtual Machine Basics – Taxonomy of Virtual Machines – Hypervisor – Key Concepts – Virtualization structure – Implementation levels of virtualization – Virtualization Types: Full Virtualization – Para Virtualization – Hardware Virtualization – Virtualization of CPU, Memory and I/O devices.

UNIT III VIRTUALIZATION INFRASTRUCTURE AND DOCKER 9

Desktop Virtualization – Network Virtualization – Storage Virtualization – System-level of Operating Virtualization – Application Virtualization – Virtual clusters and Resource Management – Containers vs. Virtual Machines – Introduction to Docker – Docker Components – Docker Container – Docker Images and Repositories.

UNIT IV CLOUD DEPLOYMENT ENVIRONMENT 9

Google App Engine – Amazon AWS – Microsoft Azure; Cloud Software Environments – Eucalyptus – OpenStack.

UNIT V CLOUD SECURITY 9

Virtualization System-Specific Attacks: Guest hopping – VM migration attack – hyperjacking.





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Data Security and Storage; Identity and Access Management (IAM) - IAM Challenges - IAM Architecture and Practice.

LIST OF EXPERIMENTS

(ANY 7 EXPERIMENTS)

1. Install Virtualbox/VMware/ Equivalent open source cloud Workstation with different flavours of Linux or Windows OS on top of windows 8 and above.
2. Install a C compiler in the virtual machine created using a virtual box and execute Simple Programs
3. Install Google App Engine. Create a hello world app and other simple web applications using python/java.
4. Use the GAE launcher to launch the web applications.
5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
7. Install Hadoop single node cluster and run simple applications like wordcount.
8. Creating and Executing Your First Container Using Docker.
9. Run a Container from Docker Hub

TOTAL: 45 + 15 = 60 PERIODS

OUTCOMES

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

- Explain different cloud architecture models for distributed and cloud computing
- Apply the concept of virtualization and its types.
- Experiment with virtualization of hardware resources and Docker.
- Develop and deploy services on the cloud and set up a cloud environment.
- Explain security challenges in the cloud environment.
- Classify how cloud computing is applied in various industries, from startups to enterprises, to streamline operations and support business growth

TEXT BOOKS

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. James Turnbull, "The Docker Book", O'Reilly Publishers, 2014.
3. Krutz, R. L., Vines, R. D, "Cloud security. A Comprehensive Guide to Secure Cloud Computing", Wiley Publishing, 2010.





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REFERENCES

1. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
2. Tim Mather, Subra Kumaraswamy, and Shahed Latif, "Cloud Security and Privacy: an enterprise perspective on risks and compliance", O'Reilly Media, Inc., 2009.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_cs14/preview (Basics of Computer Architecture and Organization, Networking)
2. <https://nptel.ac.in/courses/106105167> (Cloud Computing)

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	1	1	-	-	-	2	3	1	3	2	1	3
2	3	1	2	2	1	-	-	-	1	2	1	3	2	2	1
3	2	3	2	3	1	-	-	-	3	1	1	3	1	1	1
4	1	2	3	3	3	-	-	-	3	3	1	2	1	3	3
5	2	3	3	1	3	-	-	-	2	2	1	2	2	2	3
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.2	2.2	2.2	1.8	1.8	2	-	-	2.2	2.2	1	2.6	1.6	1.8	2.2

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





SEMESTER VII

23ADFP01

PROJECT WORK

L T P C
0 0 12 6

OBJECTIVES

- To develop the student's learning and skill development in a specific area of interest
- To provide students with an opportunity to apply the theoretical knowledge gained from their minor courses to a practical real-world scenario or problem
- To learn and conduct research and investigate various aspects, fostering critical thinking and problem-solving skills.
- To promote collaboration and teamwork among students, enabling them to work effectively in a team environment
- To prepare project report and to face reviews and viva voce examination.

GUIDELINES

The student can select any topic which is relevant to his/her specialization of the programme. The student should continue the work on the selected topic as per the formulated methodology. At the end of the semester, after completing the work to the satisfaction of the supervisor and review committee, a detailed report which contains clear definition of the identified problem, detailed literature review related to the area of work and methodology for carrying out the work, results and discussion, conclusion and references should be prepared as per the format prescribed by the University and submitted to the Head of the department. The students will be evaluated based on the report and viva-voce examination by a panel of examiners as per the Regulations.

TOTAL: 180 PERIODS

OUTCOMES

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

- Demonstrate a sound technical knowledge of their selected project topic.
- Develop problem-solving skills as they analyze issues, design solutions, and implement them in their projects.
- Improve their communication and presentation abilities.
- Build successful collaboration and teamwork will be evident in the project's execution and outcomes
- Explain new knowledge or insights to the relevant field, making it a valuable addition to the academic community.





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CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3
2	-	-	-	-	3	3	-	-	-	-	-	-	3	-	-
3	-	-	-	-	-	-	3	-	3	-	-	-	-	-	3
4	-	-	-	-	-	-	-	3	3	3	3	-	-	-	3
5	-	-	-	-	-	-	-	-	-	-	-	3	3	3	3
AVG	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

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





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CURRICULUM AND SYLLABI

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

(MINOR DEGREE / HONOURS - FULL STACK DEVELOPMENT)

CREDIT SUMMARY

B.Tech. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Category	Semester								Credit Total
	I	II	III	IV	V	VI	VII	VIII	
PC	-	-	3	3	3	4	-	-	13
EEC	-	-	-	-	-	-	6	-	6
Total	-	-	3	3	3	4	6	-	19





CURRICULUM AND SYLLABI

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

(MINOR / HONOURS DEGREE - BLOCKCHAIN)

B.Tech. – ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P		C	CIA	ESE
THEORY									
23ADBT01	Fundamentals of Blockchain	PC	3	0	0	3	40	60	100
23ADBT02	Blockchain Platforms and Use cases	PC	3	0	0	3	40	60	100
23ADBT03	Blockchain Security and Performance	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23ADBE01	Smart Contracts and Solidity	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23ADBP01	Project Work	EEC	0	0	12	6	40	60	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

23ADBT01

FUNDAMENTALS OF BLOCKCHAIN

L T P C

3 0 0 3

OBJECTIVES

- To understand the fundamental concepts of blockchain technology.
- To understand the Bitcoin Blockchain model.
- To study and explore the Ethereum Blockchain, with a focus on Smart Contracts, Ethereum Structure, Operations, Consensus Model, and Incentive Model.
- To understand and learn about different types of blockchain.
- To understand the different types of consensus algorithms.

UNIT I INTRODUCTION

9

The Double-Spend Problem, Byzantine Generals' Computing Problems, PublicKey Cryptography, Hashing, Distributed Systems, Distributed Consensus.

UNIT II TECHNOLOGY STACK AND BITCOIN BLOCKCHAIN

9

Technology Stack: Blockchain, Protocol, Currency. Bitcoin Blockchain: Structure, Operations, Features, Consensus Model, Incentive Model.

UNIT III ETHEREUM BLOCKCHAIN

9

Ethereum Blockchain: Smart Contracts, Ethereum Structure, Operations, Consensus Model, Incentive Model.

UNIT IV TIERS OF BLOCKCHAIN TECHNOLOGY

9

Tiers of Blockchain Technology: Blockchain 1.0, Blockchain 2.0, Blockchain 3.0, Types of Blockchain: Public Blockchain, Private Blockchain, Semi-Private Blockchain, Sidechains.

UNIT V TYPES OF CONSENSUS ALGORITHMS

9

Types of Consensus Algorithms: Proof of Stake, Proof of Work, Delegated Proof of Stake, Proof Elapsed Time, Deposit-Based Consensus, Proof of Importance, Federated Consensus or Federated Byzantine Consensus, Practical Byzantine Fault Tolerance. Blockchain Use Case: Supply Chain Management.

TOTAL : 45 PERIODS

OUTCOMES

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





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- Demonstrate a clear understanding of the fundamental concepts and challenges addressed by blockchain technology.
- Explain the Technology Stack of blockchain systems and the roles of Blockchain, Protocol, and Currency layers in a blockchain ecosystem.
- Analyze the Ethereum Blockchain, with a focus on Smart Contracts, Ethereum Structure, Operations, Consensus Model, and Incentive Model.
- Differentiate between various tiers of blockchain technology and understand the unique characteristics of different types of blockchains.
- Compare and contrast various Consensus Algorithms used in blockchain networks.

TEXT BOOKS

1. Kirankalyan Kulkarni, "Essentials of Bitcoin and Block chain", Packt Publishing, 2018.
2. Anshul Kaushik, "Block Chain & Crypto Currencies", Khanna Publishing House, 2018.

REFERENCES

1. Tiana Laurence, "Block chain for Dummies", John Wiley & Sons, Second Edition 2019.
2. Imran Bashir, "Mastering Block chain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Block chain frameworks" , Packet Publishing 2017.

E-RESOURCES

1. <https://www.coursera.org/specializations/blockchain>
2. <https://nptel.ac.in/courses/106105184/>
3. https://swayam.gov.in/nd1_noc20_cs01/preview

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	2	1	1	1	-	-	-	2	3	1	3	2	1	3
2	3	1	2	2	1	-	-	-	1	2	1	3	2	2	1
3	2	3	2	3	1	-	-	-	3	1	1	3	1	1	1
4	1	2	3	3	3	-	-	-	3	3	1	2	1	3	3
5	2	3	3	1	3	-	-	-	2	2	1	2	2	2	3
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.2	2.2	2.2	1.8	1.8	2	-	-	2.2	2.2	1	2.6	1.6	1.8	2.2

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SEMESTER IV

23ADBT02 BLOCKCHAIN PLATFORMS AND USE CASES L T P C
3 0 0 3

OBJECTIVES

- To learn different types of blockchain platforms.
- To understand different types of Decentralized applications developed using blockchain technology.
- To learn and compare different blockchain platforms based on their consensus mechanisms, performance, scalability, security, and suitability for various use cases.
- To study a wide range of real-world use cases for blockchain technology.
- To understand several types of blockchain use cases.

UNIT I PERMISSIONED BLOCKCHAINS 9

Hyperledger Fabric Services, Model and Functions, Hyperledger Composer, Microsoft Azure Blockchain Platform and Services, Other Platforms: IOTA, TRON, Ziliqa, Cosmos, Ripple.

UNIT II DECENTRALIZED APPLICATION PLATFORMS 9

Augur-Decentralised Prediction Market Platform, Grid+-Energy Ecosystem Platform.

UNIT III CHALLENGES AND SOLUTIONS RELATED TO BLOCKCHAIN 9

Consensus, Scalability, Privacy and Confidentiality, Escrow, and Multi signature.

UNIT IV INTERPLANETARY FILE SYSTEM 9

Alternative Decentralized Solutions: Interplanetary File System (IPFS) Working and Uses, Hashgraph- Working, Benefits, And Use-Cases.

UNIT V BLOCKCHAIN USE CASES 9

Financial Services Related Use Cases, Revolutionization of Global Trade, Digital Identity, Auditing Services, Supply Chain Management, Healthcare Related Services, Blockchain and IOT, Blockchain and AI.

TOTAL: 45 PERIODS

OUTCOMES

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

- Classify various blockchain platforms and their underlying technologies



- Explain the concept of the Grid+-Energy Ecosystem Platform and its decentralized nature for energy-related applications.
- Identify and analyze the challenges related to consensus mechanisms in blockchain networks and propose potential solutions
- Explain a clear understanding of the Interplanetary File System (IPFS) and its decentralized approach to file storage and sharing
- Explain the use of block chain technology in various financial services applications, such as payment systems, remittances, and asset tokenization

TEXT BOOKS

1. Tiana Laurence, "Blockchain for Dummies", John Wiley & Sons Publisher, Second Edition 2019.
2. Anshul Kaushik, "Block Chain & Crypto Currencies", Khanna Publishing House, 2018.

REFERENCES

1. Narayan Prusty, "Building Blockchain Projects", Packt Publishing, 2017.
2. Imran Bashir, "Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks", Packt Publishing, 2017.

E-RESOURCES

1. <https://nptel.ac.in/courses/106105184/>
2. <https://www.coursera.org/learn/blockchain-platforms>

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	1	1	3	1	-	-	-	3	3	2	1	3	3	1
2	2	3	1	3	2	-	-	-	1	2	2	2	1	2	2
3	1	3	3	2	2	-	-	-	2	3	1	2	1	3	3
4	1	2	3	3	1	-	-	-	3	2	1	3	3	3	3
5	1	2	3	2	1	-	-	-	2	1	1	1	3	2	2
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	1.6	2.2	2.2	2.6	1.4	-	-	-	2.2	2.2	1.4	1.8	2.2	2.6	2.2

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



SEMESTER V

23ADBT03 BLOCKCHAIN SECURITY AND PERFORMANCE L T P C
3 0 0 3

OBJECTIVES

- To understand the various security issues associated with blockchain technology
- To learn different security tools for smart contracts
- To study performance-related challenges in blockchain networks
- To learn various performance improvement techniques
- To study different applications of blockchain technology

UNIT I SECURITY ISSUES 9

Blockchain Related Issues, Higher-Level Language (Solidity) Related Issues, EVM Bytecode Related Issues, Real-Life Attacks on Blockchain Applications/ Smart Contracts, Trusted Execution Environments

UNIT II SECURITY TOOLS FOR SMART CONTRACTS 9

Working, Advantages, And Disadvantages of Tools- Oyente, Securify, Maian, Manticore, Mythril, SmartCheck, Verx. Secure Key Management, Quantum Resilience Keys.

UNIT III PERFORMANCE RELATED ISSUES 9

Transaction Speed, Transaction Fees, Network Size, Complexity, Interoperability Problems, Lack of Standardization. Lack of Supportive Regulations Related to Blockchain Applications

UNIT IV PERFORMANCE IMPROVEMENTS 9

Off-Chain State Channels, Sidechains, Parallels Chains, Concurrent Smart Contract Transactions, Sharding Technique and Its Benefits, Atomic Swaps Between Smart Contracts.

UNIT V BLOCKCHAIN APPLICATIONS 9

Decentralized Cryptocurrency, Distributed Cloud Storage, EVoting, Insurance Claims, Cross-Border Payments, Asset Management, Smart Appliances.

TOTAL: 45 PERIODS

OUTCOMES

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

- Identify and evaluate security vulnerabilities and risks in blockchain applications and smart contracts





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- Explain a thorough understanding of various security tools used for auditing and analyzing smart contracts
- Recognize the challenges related to interoperability and the lack of supportive regulations for blockchain applications
- Identify and apply performance improvement techniques to enhance the scalability and efficiency of blockchain systems
- Understand the potential benefits and limitations of implementing blockchain solutions in different real-world scenarios

TEXT BOOKS

1. Andreas Antonopoulos and Gavin Wood, " Mastering Ethereum: Building Smart Contracts and Dapps ", Shroff Publisher/O'Reilly Publisher.
2. Rajendra Akerkar, Natarajan Meghanathan, and Dhinaharan Nagamalai ,"Blockchain and Healthcare: New Era of Digital Health Systems", Springer Publisher, 2019.

REFERENCES

1. Daniel Drescher ,"Blockchain Basics: A Non-Technical Introduction in 25 Steps", Apress Publication, 2017.
2. Arshdeep Bahga and Vijay Madiseti, "Blockchain for Business: A Hands-On Approach", VPT Publisher, 2020.

E-RESOURCES

1. <https://www.edx.org/course/blockchain-and-fintech-basics-applications-and-limitations>
2. <https://nptel.ac.in/courses/106105235>

Mapping of Cos-Pos & PSOs

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1	3	2	3	1	-	-	-	-	1	3	1	2	3	1	1
2	1	3	3	3	2	-	-	-	1	2	2	2	1	2	2
3	2	3	3	3	1	-	-	-	1	3	1	2	1	2	1
4	3	3	1	1	1	-	-	-	3	1	1	3	2	3	3
5	3	2	2	3	2	-	-	-	1	2	1	2	2	2	1
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.4	2.6	2.4	2.2	1.5	-	-	-	1.4	2.2	1.2	2.2	1.8	2	1.6

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





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SEMESTER VI

23ADBE01

SMART CONTRACTS AND SOLIDITY

L T P C

3 0 2 4

OBJECTIVES

- To understand the concept of smart contracts related to blockchain
- To understand the life cycle of a smart contract, from development to deployment and execution
- To learn the Solidity programming language
- To understand the Truffle framework and Ganache for smart contract development and deployment
- To learn how to create decentralized applications (DApps), which include both smart contracts and front-end user interfaces
- To understand the process of connecting a smart contract with the front-end application of a DApp

UNIT I SMART CONTRACTS

9

Definition and Need, Features of Smart Contracts, Life Cycle of a Smart Contract, Introduction to Ethereum Higher-Level Languages.

UNIT II DEVELOPMENT ENVIRONMENT

9

Building A Simple Smart Contract with Solidity, SolcCompiler, Ethereum Contract ABI, Remix-IDE for Smart Contract Development.

UNIT III INTRODUCTION TO SOLIDITY

9

Introduction to Solidity: Contracts, Constructors & Functions, Variables, Getters & Setters, Arrays, Memory vs Storage, Mappings in Solidity. Advanced Solidity: Structs, Error Handling & Restrictions, Libraries, Global Variables in Solidity, Abstract Contracts, Inheritance, And Interfaces, Events

UNIT IV TRUFFLE FRAMEWORK & GANACHE

9

Environment Setup for Truffle & Ganache, Truffle Project Creation, Truffle Compile, Migrate and Create Commands.

UNIT V DECENTRALIZED APP CREATION

9

Smart Contract Creation, Front-End Creation, Connecting Smart Contract with Front-End Application, Deploying Dapp, Validation, And Testing of Dapp.





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LIST OF EXPERIMENTS

(ANY 7 EXPERIMENTS)

1. Create a simple Solidity smart contract that allows you to store and retrieve a "Hello, World!" message on the blockchain.
2. Develop a Solidity contract that accepts incoming transactions, stores sender information, and emits an event when a new transaction occurs.
3. Write a Solidity smart contract to create a basic ERC-20 token with functions for minting, transferring, and querying the token balance.
4. Design a crowdfunding smart contract where users can contribute funds, and the contract releases funds to the campaign creator when a predefined goal is reached.
5. Create a voting decentralized application (DApp) using Solidity, where users can cast their votes for a given proposal, and the contract calculates the winner.
6. Design a simple DAO using a Solidity smart contract, allowing members to vote on proposals for decision-making.
7. Implement a Solidity contract that locks funds for a specified duration and releases them only after a predetermined time.
8. Develop a Solidity contract that generates a random number using various methods like block hash and chainlink VRF.
9. Create a multi-signature wallet contract that requires multiple parties' approval for fund withdrawals.
10. Build a basic decentralized marketplace using Solidity, where users can list items for sale and other users can purchase them using cryptocurrency.

TOTAL : 45 + 15 = 60 PERIODS

OUTCOMES

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

- Classify the life cycle of a smart contract, from its inception to execution and eventual termination.
- Create a simple smart contract using Solidity and the necessary tools like SolcCompiler and Remix-IDE
- Apply various data structures in Solidity, such as arrays and mappings, and differentiate between memory and storage usage
- Develop a Truffle project and learn how to use Truffle commands
- Design a complete decentralized application (DApp) by combining smart contract development with front-end creation





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- Deploy the DApp on the Ethereum blockchain and perform thorough validation and testing to ensure its functionality and security

TEXT BOOKS

1. Tiana Laurence, "Blockchain for Dummies", John Wiley & Sons publisher, Second Edition 2019.
2. Anshul Kaushik, "Block Chain & Crypto Currencies", Khanna Publishing House , 2020.

REFERENCES

1. Narayan Prusty, "Building Blockchain Projects", Packt Publishing, 2017.
2. Andreas Antonopoulos and Gavin Wood, "Mastering Ethereum: Building Smart Contracts and Dapps", Shroff Publisher/O'Reilly Publisher, 2018.

E-RESOURCES

1. <https://www.coursera.org/learn/smarter-contracts>
2. <https://www.udemy.com/course/solidity-smart-contracts-build-dapps-in-ethereum-blockchain/>
3. https://swayam.gov.in/nd1_noc20_cs01/preview

Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	3	-	1	-	3	-	-	-	-	2	-	-	-
2	1	-	2	-	1	-	-	-	-	-	-	-	-	-	-
3	2	2	3	1	1	1	-	-	-	-	-	1	-	-	-
4	1	1	2	1	-	-	-	-	-	-	-	-	-	-	-
5	2	1	2	1	3	-	1	-	-	-	-	-	-	-	-
6	2	3	-	2	3	-	-	-	-	-	-	-	-	-	-
AVG	1.6	1.6	2.4	1.25	1.8	1	2	-	-	-	-	1.5	-	-	-

4. 1-Low 2-Medium 3-High '-' – No Correlation





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SEMESTER VII

23ADBP01

PROJECT WORK

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0 0 12 6

OBJECTIVES

- To develop the student's learning and skill development in a specific area of interest
- To provide students with an opportunity to apply the theoretical knowledge gained from their minor courses to a practical real-world scenario or problem
- To learn and conduct research and investigate various aspects, fostering critical thinking and problem-solving skills.
- To promote collaboration and teamwork among students, enabling them to work effectively in a team environment
- To prepare project report and to face reviews and viva voce examination.

GUIDELINES FOR REVIEW AND EVALUATION

The student can select any topic which is relevant to his/her specialization of the programme. The student should continue the work on the selected topic as per the formulated methodology. At the end of the semester, after completing the work to the satisfaction of the supervisor and review committee, a detailed report which contains clear definition of the identified problem, detailed literature review related to the area of work and methodology for carrying out the work, results and discussion, conclusion and references should be prepared as per the format prescribed by the University and submitted to the Head of the department. The students will be evaluated based on the report and viva-voce examination by a panel of examiners as per the Regulations.

TOTAL: 180 PERIODS

OUTCOMES

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

- Demonstrate a sound technical knowledge of their selected project topic.
- Develop problem-solving skills as they analyze issues, design solutions, and implement them in their projects.
- Improve their communication and presentation abilities.
- Build successful collaboration and teamwork will be evident in the project's execution and outcomes
- Explain new knowledge or insights to the relevant field, making it a valuable addition to the academic community.





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Mapping of Cos-Pos & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3
2	-	-	-	-	3	3	-	-	-	-	-	-	3	-	-
3	-	-	-	-	-	-	3	-	3	-	-	-	-	-	3
4	-	-	-	-	-	-	-	3	3	3	3	-	-	-	3
5	-	-	-	-	-	-	-	-	-	-	-	3	3	3	3
AVG	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

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





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CURRICULUM AND SYLLABI
FOR B.E. / B.Tech. DEGREE PROGRAMMES
(MINOR DEGREE / HONOURS - BLOCKCHAIN)
CREDIT SUMMARY

B.Tech. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Category	Semester								Credit Total
	I	II	III	IV	V	VI	VII	VIII	
PC	-	-	3	3	3	4	-	-	13
EEC	-	-	-	-	-	-	6	-	6
Total	-	-	3	3	3	4	6	-	19

