SHREE VENKATESHWARA HI-TECH ENGINEERING COLLEGE
(Autonomous)
Gobichettipalayam, Erode -638455

Regulation 2023 (UG)
Curriculum and Syllabus
B.E.-Computer Science and Engineering (Cyber Security)

I. Program Educational Objective (PEO)

PEO1 : Technical Skills: Apply their technical competence in computer science to solve real world problems, with technical and people leadership

PEO2 : Problem Solving Skills: Conduct cutting edge study and develop solutions on problems of social relevance.

PEO3 : Professional Skills: Work in a business environment, exhibiting team skills, work ethics, adaptability and lifelong learning

II. Program Outcomes (POs)

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modeling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Teamwork: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

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PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10:Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for (i) Independent and life-long learning (ii) adaptability to new and emerging technologies and (iii) Critical thinking in the broadest context of technological change. (WK8)

III. Program Specific Outcomes (PSOs)

PSO 1 : Technological Ability: Exhibit design and programming skills to build and automate business solutions using cutting edge technologies.

PSO 2 : Problem Solving Skill: Strong theoretical and practical foundation leading to excellence and excitement towards problem solving, to provide elegant solutions to complex problems.

PSO 3 : Application Development: Ability to work effectively with various engineering fields as a team to design, build and develop system applications.

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Mapping of Course Outcome and Programme Outcome														
Year	Sem	Course name	PO										PSO		
			1	2	3	4	5	6	7	9	10	11	1	2	3
I	I	Induction Programme													
		Professional English - I	-	-	-	2	-	-	2	3	-	3	-	-	-
		Matrices and Calculus	3	3	1	1	-	-	2	-	2	3	-	-	-
		Engineering Physics	3	3	2	1	2	-	-	-	-	1	-	-	-
		Engineering Chemistry	3	2	2	1	1	3	-	-	-	1	-	-	-
		Problem Solving and Python Programming	2	2	3	3	3	-	-	-	-	1	2	3	3
		தமிழர் மரபு /Heritage of Tamils	-	-	-	-	-	1	-	1	-	-	-	-	-
		Problem Solving and													
		Python Programming Laboratory	2	2	3	3	2	-	-	-	-	1	2	3	3
		Physics and Chemistry Laboratory	3	3	1	1	-	-	-	-	-	-	-	-	-
			3	2	1	-	1	2	-	-	-	1	-	-	-
		English Laboratory	-	-	-	-	-	-	3	3	-	2	-	-	-
	II	Professional English - II	-	1	1	-	-	1	2	3	-	2	-	-	-
		Numerical Methods and Statistics	3	3	1	1	1	-	2	-	2	3	-	-	-
		Physics for Information Science	3	1	2	1	2	1	-	-	-	-	-	-	-
		Basic Electrical and Electronics Engineering	3	3	2	2	-	-	-	1	-	-	3	3	2
		Engineering Graphics	3	1	2	-	2	-	-	3	-	2	2	2	-
		Programming in C	2	2	2	1	2	2	1	2	1	3	2	2	2
		தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	2	-	-	-	-	2	2	2	-	2	-	-	-
		Engineering Practices Laboratory	3	-	-	3	-	-	-	-	-	-	2	1	1
		Programming in C Laboratory	2	2	2	2	1	2	-	2	1	2	2	2	2
		Communication Laboratory	-	-	2	-	-	-	3	3	-	3	-	-	-
		Mandatory Course - I Yoga for Human Excellence	-	-	-	-	-	-	-	-	-	-	-	-	-

1 - low, 2 - medium, 3 - high, '-' - no correlation

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Mapping of Course Outcome and Programme Outcome

Year	Sem	Course name	PO											PSO		
			1	2	3	4	5	6	7	8	9	10	11	1	2	3
II	III	Discrete Mathematics	3	3	2	2	-	2	-	-	2	-	2	-	-	-
		Foundations of Data Science	2	2	1	2	2	1	1	1	1	1	2	2	2	2
		Data Structures and Algorithms	2.2	2.6	2.6	2.6	1.6	-	-	3	-	2	2	3	2	2
		Object Oriented Programming	2	1	2	2	2	-	-	2	2	1	2	3	2	2
		Digital Principles and Computer Organization	3	3	3	3	1.8	1.6	1	1	1	1.6	2.6	1.4	2.6	1.6
		Entrepreneurship and Startup	2	2	2	1.6	1	-	-	-	-	-	-	2	2	2
		Data Science Laboratory	2	2	2	2	1	-	-	2	2	2	2	2	3	2
		Data Structures and Algorithms Laboratory	2.8	1.8	1.8	0.8	1	-	-	2	3	1	2	1.2	2.6	1
		Object Oriented Programming Laboratory	2	2	2	2	2	-	-	2	2	2	2	2	2	2
	IV	Database Management Systems and Security	2	2	2	1	1	-	1	2	2	3	2	3	3	-
		Theory of Computation	2	2	2	2	1	-	-	1	2	2	2	2	2	2
		Operating Systems and Security	3	3	3	3	2	1	1	1	2	2	3	2	3	-
		Artificial Intelligence and Machine Learning	2	1	2	2	1	-	-	2	2	2	3	2	2	2
		Engineering Secure Software Systems	1.8	2.2	2	2.4	2.2	-	-	1.8	1	1.8	1.8	1.5	1.8	-
		Environmental Sciences and Sustainability	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Database Management Systems and Security Laboratory	2	2	3	1	3	1	2	3	2	2	2	2	3	-
		Mandatory Course - II Soft and Analytical Skills-I	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1 - low, 2 - medium, 3 - high, '-' - no correlation

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Mapping of Course Outcome and Programme Outcome

Year	Sem	Course name	PO											PSO		
			1	2	3	4	5	6	7	8	9	10	11	1	2	3
III	V	Cyber Forensics	2	2	1	2	2	1	1	-	-	-	2	2	2	2
		Cryptography and Cyber Security	3	3	3	3	3	-	-	-	3	-	1	3	3	-
		Distributed Computing	1.8	2.4	1.8	2.4	2	-	-	2.6	2.2	2.2	1.6	2	1.8	1.6
		Computer Networks	-	1	-	-	1	-	-	-	1	-	-	-	1	1
		Professional Elective I*														
		Professional Elective II*														
		Cryptography and Cyber Security Laboratory	3	3	3	3	3	-	-	-	3	-	1	3	3	-
		Mandatory Course – III Soft and Analytical Skills-II	2.8	1.8	1.8	0.8	1	-	-	2	3	1	2	1.2	2.6	1
		Mandatory Course – IV&	2	2	2	2	2	-	-	2	2	2	2	2	2	2
	VI	Network Security	1.8	1.8	2.4	1.8	2.2	-	-	2.4	2	1.4	1.8	2.2	1.4	2
		Embedded Systems and IoT	2.6	2	3	2.4	1.5	-	-	1	2.2	2.2	2.4	2.2	1.6	2.6
		Professional Elective III*														
		Professional Elective IV*														
		Professional Elective V*														
		Professional Elective VI*														
		Open Elective – I**														
		Mandatory Course – V &														

1 - low, 2 - medium, 3 - high, '-' - no correlation

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Mapping of Course Outcome and Programme Outcome

Year	Sem	Course name	PO											PSO		
			1	2	3	4	5	6	7	8	9	10	11	1	2	3
IV	VII	Universal Human Values - 2	3	3	2	2	-	2	-	-	2	-	2	-	-	-
		Elective – Management#														
		Open Elective – II**														
		Open Elective – III**														
		Open Elective – IV**														
		Summer internship@														
		Mini Project														
	VIII	Project Work														

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Curriculum and Syllabus
B.E.-Computer Science and Engineering(Cyber Security)

SEMESTER I

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Induction Program											
1.	23IPA11	Induction Programme	-	-	-	-	-	0	-	-	-
Theory											
2.	23ENT11	Professional English - I	HSS	3	0	0	3	3	40	60	100
3.	23MAT11	Matrices and Calculus	BS	3	1	0	4	4	40	60	100
4.	23PHT11	Engineering Physics	BS	3	0	0	3	3	40	60	100
5.	23CYT11	Engineering Chemistry	BS	3	0	0	3	3	40	60	100
6.	23CST11	Problem Solving and Python Programming	ES	3	0	0	3	3	40	60	100
7.	23TAT11	தமிழர் மரபு /Heritage of Tamils	HSS	1	0	0	1	1	40	60	100
Practicals											
8.	23CSL11	Problem Solving and Python Programming Laboratory	ES	0	0	4	4	2	60	40	100
9.	23PCL11	Physics and Chemistry Laboratory	BS	0	0	4	4	2	60	40	100
10.	23ENL11	English Laboratory	EEC	0	0	2	2	1	60	40	100
		Total		**16**	**1**	**10**	**27**	**22**			

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SUMMARY OF CREDITS

S.No	Course Category	Credits per Semester								Total Credits	Credits in %	Credits as per AU Curriculum R-2021	Credits as per AICTE Model Curriculum 2022
		I	II	III	IV	V	VI	VII	VIII				
1	HSS	4	3					5		12	7.27	12	16
2	BS	12	7	4	2					25	15.15	25	23
3	ES	5	9	4						18	10.91	18	29
4	PC		5	15	18.5	15.5	8			62	37.58	61	59
5	PE					6	12			18	10.91	18	12
6	OE						3	9		12	7.27	12	9
7	EEC	1	2	1				4	10	18	10.91	16	15
8	MC		√		√	√ / √	√						
Total Credits / Semester		**22**	**26**	**24**	**20.5**	**21.5**	**23**	**18**	**10**	**165**	**100**	**162**	**163**

CATEGORIZATION OF COURSES

i. Humanities and Social Sciences including Management Courses (HSS)
ii. Basic Science Courses (BS)
iii. Engineering Science Courses (ES)
iv. Professional Core Courses (PC)
v. Professional Elective Courses (PE)
vi. Open Elective Courses (OE)
vii. Mandatory Courses (MC)
viii. Employability Enhancement Courses (EEC)
ix. Other Courses (OC)

ENROLLMENT FOR B.E. / B. TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree.

For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only.

For minor degree, a student hall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes,

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SEMESTER II

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23ENT21	Professional English - II	HSS	2	0	0	2	2	40	60	100
2.	23MAT21	Numerical Methods and Statistics	BS	3	1	0	4	4	40	60	100
3.	23PHT21	Physics for Information Science	BS	3	0	0	3	3	40	60	100
4.	23EET22	Basic Electrical and Electronics Engineering	ES	3	0	0	3	3	40	60	100
5.	23MET21	Engineering Graphics	ES	2	0	4	6	4	40	60	100
6.	23CST21	Programming in C	PC	3	0	0	3	3	40	60	100
7.	23TAT21	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HSS	1	0	0	1	1	40	60	100
Practicals											
8.	23MEL21	Engineering Practices Laboratory	ES	0	0	4	4	2	60	40	100
9.	23CSL21	Programming in C Laboratory	PC	0	0	4	4	2	60	40	100
10.	23ENL21	Communication Laboratory	EEC	0	0	4	4	2	60	40	100
Mandatory Courses											
11.	23MDC21	Mandatory Course - I Yoga for Human Excellence	MC	0	0	1	1	0	100	-	100
			Total	**17**	**1**	**17**	**35**	**26**			

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SEMESTER III

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23MAT31	Discrete Mathematics	BS	3	1	0	4	4	40	60	100
2.	23CST31	Foundations of Data Science	PC	3	0	0	3	3	40	60	100
3.	23ITT31	Data Structures and Algorithms	PC	3	0	0	3	3	40	60	100
4.	23CST33	Object Oriented Programming	PC	3	0	0	3	3	40	60	100
5.	23ECI32	Digital Principles and Computer Organization	ES	3	0	2	5	4	50	50	100
6.	23EST31	Entrepreneurship and Startup	EEC	1	0	0	1	1	100	-	100
Practicals											
7.	23CSL31	Data Science Laboratory	PC	0	0	4	4	2	60	40	100
8.	23ITL31	Data Structures and Algorithms Laboratory	PC	0	0	4	4	2	60	40	100
9.	23CSL33	Object Oriented Programming Laboratory	PC	0	0	4	4	2	60	40	100
		Total		**16**	**1**	**14**	**31**	**24**			

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SEMESTER IV

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23CRT41	Database Management Systems and Security	PC	3	0	0	3	3	40	60	100
2.	23CST42	Theory of Computation	PC	3	0	0	3	3	40	60	100
3.	23CRI41	Operating Systems and Security	PC	3	0	2	5	4	50	50	100
4.	23CSI42	Artificial Intelligence and Machine Learning	PC	3	0	2	5	4	50	50	100
5.	23CRI42	Engineering Secure Software Systems	PC	2	0	2	4	3	50	50	100
6.	23CYT41	Environmental Sciences and Sustainability	BS	2	0	0	2	2	40	60	100
Practicals											
7.	23CRL41	Database Management Systems and Security Laboratory	PC	0	0	3	3	1.5	60	40	100
Mandatory Courses											
8.	23MDC41	Mandatory Course - II Soft and Analytical Skills-I	MC	1	0	0	1	0	100	-	100
		Total		**17**	**0**	**9**	**26**	**20.5**			

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SEMESTER V

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23CRI51	Cyber Forensics	PC	3	0	2	5	4	50	50	100
2.	23CST51	Cryptography and Cyber Security	PC	3	0	0	3	3	40	60	100
3.	23CST52	Distributed Computing	PC	3	0	0	3	3	40	60	100
4.	23CSI51	Computer Networks	PC	3	0	2	5	4	50	50	100
5.		Professional Elective I*	PE	-	-	-	-	3	-	-	100
6.		Professional Elective II*	PE	-	-	-	-	3	-	-	100
Practicals											
7.	23CRL51	Cryptography and Cyber Security Laboratory	PC	0	0	3	3	1.5	60	40	100
Mandatory Courses											
8.	23MDC51	Mandatory Course – III Soft and Analytical Skills-II	MC	1	0	0	1	0	100	-	100
9.		Mandatory Course – IV&	MC	3	0	0	3	0	100	-	100
		Total						**21.5**			

*** Professional Elective – I & II shall be chosen from the list of Professional electives (Verticals) offered by same Programme**

& Mandatory Course-IV is a Non-credit Course (Student shall select one course from ~~the~~ list given under Mandatory Course-IV)

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SEMESTER VI

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23CRI61	Network Security	PC	3	0	2	5	4	50	50	100
2.	23ECI62	Embedded Systems and IoT	PC	3	0	2	5	4	50	50	100
3.		Professional Elective III*	PE	-	-	-	-	3	-	-	100
4.		Professional Elective IV*	PE	-	-	-	-	3	-	-	100
5.		Professional Elective V*	PE	-	-	-	-	3	-	-	100
6.		Professional Elective VI*	PE	-	-	-	-	3	-	-	100
7.		Open Elective – I**	OE	-	-	-	-	3	-	-	100
Mandatory Courses											
8.		Mandatory Course – V &	MC	3	0	0	3	0	100	-	100
			Total					23			

* Professional Elective – III to VI shall be chosen from the list of Professional electives (Verticals) offered by same Programme

** Open Elective – I shall be chosen from the list of open electives offered by other Programmes

& Mandatory Course-V is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-V)

@ The students individually undergo training in reputed Firms/Research Institutes/ Laboratories for the specified duration (04 weeks) during VI semester summer vacation. After completion of training, a detailed report should be submitted within ten days from the commencement of VII semester.

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SEMESTER VII

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Theory											
1.	23UHV71	Universal Human Values - 2	HSS	3	0	0	3	3	40	60	100
2.		Elective – Management#	HSS	3	0	0	3	3	40	60	100
3.		Open Elective – II**	OE	-	-	-	-	3	-	-	100
4.		Open Elective – III**	OE	-	-	-	-	3	-	-	100
5.		Open Elective – IV**	OE	-	-	-	-	3	-	-	100
Practicals											
6.	23CRL71	Summer internship@	EEC	0	0	0	0	2	100	-	100
7.	23CRL72	Mini Project	EEC	0	0	2	2	1	100	-	100
			Total	**14**	**0**	**4**	**18**	**18**			

 # Elective - Management shall be chosen from the list of Elective Management courses.

**** Open Elective – II to IV Shall be chosen from the list of open electives offered by other Programmes**

@ - The students undergone summer internship during VI semester summer vacation and same will be evaluated in VII semester.

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SEMESTER VIII

S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
Practicals											
1.	23CRL81	Project Work	EEC	0	0	20	20	10	60	40	100
			Total	**0**	**0**	**20**	**20**	**10**			

TOTAL CREDITS: 165

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MANDATORY COURSES IV											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23MDC52	Introduction to Women and Gender Studies	MC	3	0	0	3	0	100	-	100
2.	23MDC53	Elements of Literature	MC	3	0	0	3	0	100	-	100
3.	23MDC54	Film Appreciation	MC	3	0	0	3	0	100	-	100
4.	23MDC55	Disaster Risk Reduction and Management	MC	3	0	0	3	0	100	-	100

MANDATORY COURSES V											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23MDC61	Well Being with Traditional Practices -Yoga, Ayurveda and Siddha	MC	3	0	0	3	0	100	-	100
2.	23MDC62	History of Science and Technology in India	MC	3	0	0	3	0	100	-	100
3.	23MDC63	Political and EconomicThought for a Humane Society	MC	3	0	0	3	0	100	-	100
4.	23MDC64	State, Nation Building and Politics in India	MC	3	0	0	3	0	100	-	100
5.	23MDC65	Industrial Safety	MC	3	0	0	3	0	100	-	100

ELECTIVE – MANAGEMENT COURSES											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23MSE71	Principles of Management	HSS	3	0	0	3	3	40	60	100
2.	23MSE72	Total Quality Management	HSS	3	0	0	3	3	40	60	100
3.	23MSE73	Engineering Economics and Financial Accounting	HSS	3	0	0	3	3	40	60	100
4.	23MSE74	Human Resource Management	HSS	3	0	0	3	3	40	60	100
5.	23MSE75	Knowledge Management	HSS	3	0	0	3	3	40	60	100
6.	23MSE76	Industrial Management	HSS	3	0	0	3	3	40	60	100

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PROFESSIONAL ELECTIVE COURSES: VERTICALS

Vertical I Data Science	Vertical II Full Stack Development	Vertical III Cloud Computing and Data Center Technologies	Vertical IV Cyber Security and Data Privacy	Vertical V Creative Media	Vertical VI Emerging Technologies	Vertical VII Artificial Intelligence and Machine Learning
Exploratory Data Analysis	Cloud Computing	Cloud Computing	Ethical Hacking	Augmented Reality/Virtual Reality	Augmented Reality/Virtual Reality	Knowledge Engineering
Recommender Systems	App Development	Virtualization	Digital and Mobile Forensics	Multimedia and Animation	Robotic Process Automation	Soft Computing
Neural Networks and Deep Learning	Cloud Services Management	Cloud ServicesManagement	Social NetworkSecurity	Video Creation and Editing	Neural Networks and Deep Learning	Neural Networks and Deep Learning
Text and Speech Analysis	UI and UX Design	Data Warehousing	Modern Cryptography	UI and UX Design	Cyber security	Text and Speech Analysis
Business Analytics	Software Testing and Automation	Storage Technologies	Engineering Secure Software Systems	Digital marketing	Quantum Computing	Optimization Techniques
Image and Video Analytics	Web Application Security	Software DefinedNetworks	Cryptocurrency and Blockchain Technologies	Visual Effects	Cryptocurrency and Blockchain Technologies	Game Theory
Computer Vision	DevOps	Stream Processing	Network Security	Game Development	Game Development	Cognitive Science
Big Data Analytics	Principles of Programming Languages	Security and Privacy in Cloud	Security and Privacy in Cloud	Multimedia Data Compression and Storage	3D Printing andDesign	Ethics And AI

Registration of Professional Elective Courses from Verticals:

Professional Elective Courses will be registered in Semesters V and VI. These courses are listed in groups called verticals that represent a particular areaof specialization / diversified group. Students are permitted to choose all the Professional Electives from a particular vertical or from different verticals. Further, only one Professional Elective course shall be chosen in a semester horizontally (row-wise). However, two courses are permitted from the same row, provided one course is enrolled in Semester V and another in semester VI.

The registration of courses for B.E./B.Tech (Honours) or Minor degree shall be done from Semester V to VIII. The procedure for registration of courses explained above shall be followed for the courses of B.E/B.Tech (Honours) or Minor degree also. For more details on B.E./B.Tech (Honours) or Minor degree refer to the Regulations 2023 (Clause 12).

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PROFESSIONAL ELECTIVE COURSES: VERTICALS

VERTICAL 1: DATA SCIENCE											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23CSE11	Exploratory Data Analysis	PE	2	0	2	4	3	50	50	100
2.	23CSE12	Recommender Systems	PE	2	0	2	4	3	50	50	100
3.	23CSE13	Neural Networks and Deep Learning	PE	2	0	2	4	3	50	50	100
4.	23CSE14	Text and Speech Analysis	PE	2	0	2	4	3	50	50	100
5.	23CSE15	Business Analytics	PE	2	0	2	4	3	50	50	100
6.	23CSE16	Image and Video Analytics	PE	2	0	2	4	3	50	50	100
7.	23CSE17	Computer Vision	PE	2	0	2	4	3	50	50	100
8.	23CSE18	Big Data Analytics	PE	2	0	2	4	3	50	50	100

VERTICAL 2: FULL STACK DEVELOPMENT											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
9.	23CSE21	Cloud Computing	PE	2	0	2	4	3	50	50	100
10.	23CSE22	App Development	PE	2	0	2	4	3	50	50	100
11.	23CSE23	Cloud Services Management	PE	2	0	2	4	3	50	50	100
12.	23CSE24	UI and UX Design	PE	2	0	2	4	3	50	50	100
13.	23CSE25	Software Testing and Automation	PE	2	0	2	4	3	50	50	100
14.	23CSE28	Principles of Programming Languages	PE	3	0	2	3	3	50	50	100
15.	23CSE27	DevOps	PE	2	0	2	4	3	50	50	100
16.	23CSE26	Web Application Security	PE	2	0	2	4	3	50	50	100

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VERTICAL 3: CLOUD COMPUTING AND DATA CENTER TECHNOLOGIES											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23CSE31	Cloud Computing	PE	2	0	2	4	4	50	50	100
2.	23CSE32	Virtualization	PE	2	0	2	4	4	50	50	100
3.	23CSE23	Cloud Services Management	PE	2	0	2	4	4	50	50	100
4.	23CSE34	Data Warehousing	PE	2	0	2	4	4	50	50	100
5.	23CSE35	Storage Technologies	PE	3	0	2	4	3	50	50	100
6.	23CSE36	Software Defined Networks	PE	2	0	2	4	4	50	50	100
7.	23CSE38	Security and Privacy in Cloud	PE	2	0	2	4	4	50	50	100
8.	23CSE37	Stream Processing	PE	3	0	0	3	4	40	60	100

VERTICAL 4: CYBER SECURITY AND DATA PRIVACY											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23CSE41	Ethical Hacking	PE	2	0	2	4	3	50	50	100
2.	23CSE42	Digital and Mobile Forensics	PE	2	0	2	4	3	50	50	100
3.	23CSE43	Social Network Security	PE	2	0	2	4	3	50	50	100
4.	23CSE44	Modern Cryptography	PE	2	0	2	4	3	50	50	100
5.	23CSE45	Malware Analysis	PE	2	0	2	4	3	50	50	100
6.	23CSE46	Cryptocurrency and Blockchain Technologies	PE	2	0	2	4	3	50	50	100
7.	23CSE26	Web Application Security	PE	2	0	2	4	3	50	50	100
8.	23CSE38	Security and Privacy in Cloud	PE	2	0	2	4	3	50	50	100

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VERTICAL 5: CREATIVE MEDIA											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23CSE51	Augmented Reality/Virtual Reality	PE	2	0	2	4	3	50	50	100
2.	23CSE52	Multimedia and Animation	PE	2	0	2	4	3	50	50	100
3.	23CSE53	Video Creation and Editing	PE	2	0	2	4	3	50	50	100
4.	23CSE24	UI and UX Design	PE	2	0	2	4	3	50	50	100
5.	23CSE55	Digital marketing	PE	2	0	2	4	3	50	50	100
6.	23CSE56	Visual Effects	PE	2	0	2	4	3	50	50	100
7.	23CSE57	Game Development	PE	2	0	2	4	3	50	50	100
8.	23CSE58	Multimedia Data Compression and Storage	PE	2	0	2	4	3	50	50	100

VERTICAL 6: EMERGING TECHNOLOGIES											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23CSE51	Augmented Reality/Virtual Reality	PE	2	0	2	4	3	50	50	100
2.	23CSE62	Robotic Process Automation	PE	2	0	2	4	3	50	50	100
3.	23CSE13	Neural Networks and Deep Learning	PE	2	0	2	4	3	50	50	100
4.	23CSE64	Cyber security	PE	2	0	2	4	3	50	50	100
5.	23CSE65	Quantum Computing	PE	2	0	2	4	3	50	50	100
6.	23CSE46	Cryptocurrency and Blockchain Technologies	PE	2	0	2	4	3	50	50	100
7.	23CSE57	Game Development	PE	2	0	2	4	3	50	50	100
8.	23CSE68	3D Printing and Design	PE	2	0	2	4	3	50	50	100

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VERTICAL 7: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING											
S.No	Course Code	Course Title	Category	Periods / Week			Total Contact Period	Credits	Max.Marks		
				L	T	P			CA	ES	TM
1.	23CSE71	Knowledge Engineering	PE	2	0	2	4	3	50	50	100
2.	23CSE72	Soft Computing	PE	2	0	2	4	3	50	50	100
3.	23CSE13	Neural Networks and Deep Learning	PE	2	0	2	4	3	50	50	100
4.	23CSE14	Text and Speech Analysis	PE	2	0	2	4	3	50	50	100
5.	23CSE75	Optimization Techniques	PE	2	0	2	4	3	50	50	100
6.	23CSE76	Game Theory	PE	2	0	2	4	3	50	50	100
7.	23CSE77	Cognitive Science	PE	2	0	2	4	3	50	50	100
8.	23CSE78	Ethics And AI	PE	2	0	2	4	3	50	50	100

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OPEN ELECTIVES

Sl. No	Course Code	Course Title	Category	Periods /Week			Total Contact Periods	Credits	Max. Marks		
				L	T	P			CA	ES	TM
OFFERED BY DEPARTMENT OF CIVIL ENGINEERING											
1	23CEO11	Civil and Infrastructure Engineering	OE	3	0	0	3	3	40	60	100
2	23CEO12	Environmental Pollution and waste management	OE	3	0	0	3	3	40	60	100
3	23CEO13	Environmental Impact Assessment	OE	3	0	0	3	3	40	60	100
4	23CEO14	Building Services	OE	3	0	0	3	3	40	60	100
5	23CEO15	Water, Sanitation and Health	OE	3	0	0	3	3	40	60	100
OFFERED BY DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING											
1	23CSO11	Foundation of AR/VR	OE	3	0	0	3	3	40	60	100
2	23CSO12	Web Designing	OE	3	0	0	3	3	40	60	100
3	23CSO13	Block Chain fundamentals	OE	3	0	0	3	3	40	60	100
4	23CSO14	Knowledge Management	OE	3	0	0	3	3	40	60	100
5	23CSO15	Cloud Computing Essentials	OE	3	0	0	3	3	40	60	100
OFFERED BY DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING											
1	23ECO11	Basics of Electronics in Automation	OE	3	0	0	3	3	40	60	100
2	23ECO12	Wireless Optical Communication	OE	3	0	0	3	3	40	60	100
3	23ECO13	Soft Computing techniques	OE	3	0	0	3	3	40	60	100
4	23ECO14	Consumer electronics	OE	3	0	0	3	3	40	60	100
5	23ECO15	Principles of communication Engineering	OE	3	0	0	3	3	40	60	100
OFFERED BY DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING											
1	23EEO11	Renewable Energy Sources	OE	3	0	0	3	3	40	60	100
2	23EEO12	Electrical Vehicle	OE	3	0	0	3	3	40	60	100
3	23EEO13	Energy Auditing and Conservation	OE	3	0	0	3	3	40	60	100
4	23EEO14	Domestic and Industrial Electrical Installations	OE	3	0	0	3	3	40	60	100
5	23EEO15	Microcontroller Based System Design	OE	3	0	0	3	3	40	60	100
OFFERED BY DEPARTMENT OF MECHANICAL ENGINEERING											
1.	23MEO11	Industrial Instrumentation	OE	3	0	0	3	3	40	60	100

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2.	23MEO12	Energy Technology	OE	3	0	0	3	3	40	60	100
3.	23MEO13	Reverse Engineering	OE	3	0	0	3	3	40	60	100
4.	23MEO14	Fire Safety Engineering	OE	3	0	0	3	3	40	60	100
5.	23MEO15	Nano Technology	OE	3	0	0	3	3	40	60	100
6.	23MEO16	Entrepreneurship Development	OE	3	0	0	3	3	40	60	100
OFFERED BY DEPARTMENT ARTIFICIAL INTELLIGENCE AND DATA SCIENCE											
1	23AD011	Introduction to Big Data	OE	3	0	0	3	3	40	60	100
2	23AD012	Principles of Data Science	OE	3	0	0	3	3	40	60	100
3	23AD013	Data Visualization and its Applications	OE	3	0	0	3	3	40	60	100
4	23AD014	Data Warehousing and Mining	OE	3	0	0	3	3	40	60	100
5	23AD015	Principles of Cyber Security	OE	3	0	0	3	3	40	60	100
OFFERED BY DEPARTMENT INFORMATION TECHNOLOGY											
1	23IT011	Basics of Java Programming	OE	3	0	0	3	3	40	60	100
2	23IT012	Ethical Hacking	OE	3	0	0	3	3	40	60	100
3	23IT013	E-Commerce and Applications	OE	3	0	0	3	3	40	60	100
4	23IT014	Basics of Android Application Development	OE	3	0	0	3	3	40	60	100
5	23IT015	Introduction to Web Design	OE	3	0	0	3	3	40	60	100
OFFERED BY DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY											
1	23PTO11	Nutraceuticals	OE	3	0	0	3	3	40	60	100
2	23PTO12	IPR for Pharma Industry	OE	3	0	0	3	3	40	60	100
3	23PTO13	Pharmaceutical Nanotechnology	OE	3	0	0	3	3	40	60	100
4	23PTO14	Basics of Human Anatomy and physiology	OE	3	0	0	3	3	40	60	100
OFFERED BY DEPARTMENT BIOMEDICAL ENGINEERING											
1	23BMO11	Biosensors and Instrumentation	OE	3	0	0	3	3	40	60	100
2	23BMO12	Medical Robotics	OE	3	0	0	3	3	40	60	100
3	23BMO13	Biometric systems and their applications	OE	3	0	0	3	3	40	60	100
4	23BMO14	Healthcare Management systems	OE	3	0	0	3	3	40	60	100
5	23BMO15	IoT in Healthcare	OE	3	0	0	3	3	40	60	100

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OFFERED BY DEPARTMENT OF BIOTECHNOLOGY											
1.	23BTO11	Biofertilizer Technology	OE	3	0	0	3	3	40	60	100
2.	23BTO12	Ecology	OE	3	0	0	3	3	40	60	100
3.	23BTO13	Biotechnology for Forensics	OE	3	0	0	3	3	40	60	100
4.	23BTO14	Microbiology and Macromolecule	OE	3	0	0	3	3	40	60	100
5.	23BTO15	Biodiversity and Taxonomy	OE	3	0	0	3	3	40	60	100
OFFERED BY DEPARTMENT CSE (CYBER SECURITY)											
1	23CRO11	Mobile Device Security	OE	3	0	0	3	3	40	60	100
2	23CRO12	Malware Analysis	OE	3	0	0	3	3	40	60	100
3	23CRO13	Hardware Security	OE	3	0	0	3	3	40	60	100
4	23CRO14	Web and Mobile Application Security	OE	3	0	0	3	3	40	60	100
5	23CRO15	Information Security	OE	3	0	0	3	3	40	60	100
OFFERED BY DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING											
1	23AMO11	AI For Everyone	OE	3	0	0	3	3	40	60	100
2	23AMO12	Machine Learning and its Applications	OE	3	0	0	3	3	40	60	100
3	23AMO13	Quantum AI	OE	3	0	0	3	3	40	60	100
4	23AMO14	Reinforcement Learning	OE	3	0	0	3	3	40	60	100
5	23AMO15	Network Automation Using AIML	OE	3	0	0	3	3	40	60	100

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23IPA11	**INDUCTION PROGRAMME** **(Common to B.E./B.Tech. all Branches)**	**L T P C** - - - **0**

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

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

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

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character. "
Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

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

(i) Ice breaking :

Ice-breaking activities were conducted within the respective departments/branches to facilitate interaction among students. These sessions helped participants become acquainted with one another, fostered a sense of belonging, and encouraged teamwork and effective communication. The activities created a friendly and engaging learning environment.

(ii) Creative Arts and Physical Activities:

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it every day for the duration of the program. These would allow for creative expression and it would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later. Physical Activitieswould involve a daily routine of physical activity with games and sports, gardening, etc.

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(iii) Universal Human Values:

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

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

(iv) Literary Activity:

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

(v) Proficiency Modules:

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

(vi) Lectures by Eminent People:

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

(vii) Visits to Local Area:

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

(viii) Familiarization to Dept./Branch & Innovations:

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

(ix) Department Specific Activities:

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering/Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop.

For example, CSE and IT students may be introduced to activities that kindle computational

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thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

(x) Life at SVHEC and its activities:

A campus tour was organized to familiarize students with the college infrastructure and facilities. During the tour, students visited various academic blocks, laboratories, library, seminar halls, sports facilities, administrative offices, and other important locations within the campus. The session helped students gain a better understanding of the resources available to support their academic and personal development while fostering a sense of comfort and belonging in the new environment.

A session on college activities was conducted to introduce students to the various academic, co-curricular, and extracurricular opportunities available on campus. Students were informed about clubs, professional societies, cultural events, sports activities, community service initiatives, and skill development programmes. The session encouraged active participation and highlighted the importance of holistic development alongside academic excellence.

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

REFERENCES:

1. Guide to Induction program from AICTE

COURSEOUTCOMES:

At the end of the course the students will be able

CO1:	To listen to and understand general and complex academic information
CO2:	To listen to and understand different points of view in a discussion
CO3:	To speak fluently and accurately informal and informal communicative contexts
CO4:	To describe products and processes and explain their uses clearly as well as accurately
CO5:	To express their opinions effectively in both formal and informal discussions

E.RESOURCES:

- https://www.ted.com/about/programs-initiatives/ted-talks-education
- https://learnenglish.britishcouncil.org/

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CO's-PO's & PSO's MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	3	3	-	3	1	-	-
CO2	-	-	-	-	-	-	-	3	3	-	3	1	-	-
CO3	-	-	-	-	-	-	1	2	3	-	2	1	1	-
CO4	-	-	-	-	-	-	-	2	3	-	2	1	1	-
CO5	-	-	-	-	-	-	1	3	3	-	2	1	1	1
AVG	-	-	-	-	-	-	1.00	2.60	3.00	-	2.40	1.00	1.00	1.00

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

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23ENT11	PROFESSIONAL ENGLISH – I (Common to B.E./B.Tech. all Branches)	L T P C 3 0 0 3

COURSE OBJECTIVES:

- To improve the communicative competence of learners
- To learn to use basic grammatical structures in suitable contexts
- To acquire lexical competence and use them appropriately in a sentence and understand their meaning in a text
- To help learners use language effectively in professional contexts
- To develop learners' ability to read and write complex texts, summaries, articles, blogs,de initions, essays and user manuals.

UNIT-I **INTRODUCTION TO EFFECTIVE COMMUNICATION AND FUNDAMENTALS OF COMMUNICATION** **10**

Introduction to Effective Communication- Barriers of Communication, Seven C's of Effective Communication, Effective Listening, Effective Speaking, Excellence in Reading, Ways to Develop Language and Communication Skills.

Reading- Reading Brochures (Technical Context), Telephone Messages/ Social Media Messages Relevant To Technical Contexts And Emails.

Writing- Writing Emails / Letters Introducing Oneself

Grammar- Present Tense (Simple and Progressive); Question Types: Wh/ Yes Or No/ and Tags

Vocabulary- Synonyms; One Word Substitution; Abbreviations & Acronyms (as Used in TechnicalContexts)

UNIT-II **NARRATION AND SUMMATION** **9**

Reading - Reading Biographies, Travelogues, Newspaper Reports, Excerpts from Literature, and Travel & Technical Blogs.

Writing - Guided writing, Paragraph Writing, Short Report on an Event (Field Trip etc.)

Grammar - Past Tense (Simple); Subject-Verb Agreement; and Prepositions.

Vocabulary - Word Forms (Pre ixes& Suf ixes); Synonyms and Antonyms. Phrasal Verbs.

UNIT-III **DESCRIPTION OF A PROCESS / PRODUCT** **9**

Reading - Reading Advertisements, Gadget Reviews; User Manuals.

Writing - Writing De initions; Instructions; and Product /Process Description.

Grammar - Imperatives; Adjectives; Degrees of Comparison; Present & Past Perfect Tenses.

Vocabulary- Compound Nouns, Homonyms; and Homophones, Discourse Markers (Connectives& Sequence Words)

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UNIT-IV **CLASSIFICATION AND RECOMMENDATIONS** **9**

Reading - Newspaper Articles; Journal Reports –and Non Verbal Communication (Tables, Pie Charts etc...)
Writing - Note-making / Note-taking (*Study skills to be taught, not tested); Writing Recommendations; Transferring Information from Non Verbal (Chart , Graph etc, to Verbal Mode)
Grammar - Articles; Pronouns - Possessive & Relative Pronouns.
Vocabulary - Collocations; Fixed / Semi Fixed Expressions

UNIT-V **EXPRESSION** **8**

Reading - Reading Editorials; and Opinion Blogs;
Writing - Essay Writing (Descriptive or Narrative).
Grammar- Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences.
Vocabulary - Cause & Effect Expressions – Content vs. Function Words.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the Course the students will able to

CO1:	Use appropriate words in a professional context
CO2:	Gain understanding of basic grammatical structures and use them in right context
CO3:	Read and infer the denotative and connotative meanings of technical text
CO4:	Read and interpret information presented in tables, charts and other graphic forms
CO5:	Write de initions, descriptions, narrations and essays on various topics

TEXT BOOKS:

1. Department of English, Anna University, "English for Engineers & Technologists" Orient Blackswan Private Ltd, 2020.
2. Dr.Veena Selvam, Dr.Sujatha Priyadarshini, & CO, Department of English, Anna University, "English for Science & Technology" Cambridge University Press, 2021.

REFERENCE BOOKS:

1. Meenakshi Raman & Sangeeta Sharma, "Technical Communication–Principles and Practices", Oxford Univ. Press, New Delhi, 2016.

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2. Lakshminarayanan, "A Course Book on Technical English", Scitech Publications (India) Pvt.Ltd. 2012.
3. Aysha Viswamohan, "English For Technical Communication (With CD)", Mcgraw HillEducation, ISBN : 0070264244, 2008.
4. Effective Communication Skill, Kulbhusan Kumar, R S Salaria, Khanna Publishing House, 2016.

E. RESOURCES:

- https://learnenglish.britishcouncil.org/

CO's-PO's MAPPING :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	2	3	-	3	-	1	3
CO2	-	-	-	-	-	1	-	2	3	-	2	-	1	2
CO3	-	-	-	-	-	1	-	3	3	-	3	1	2	3
CO4	-	-	-	2	-	-	-	3	3	-	3	1	2	3
CO5	-	-	-	-	-	-	-	2	3	-	2	-	2	3
AVR	-	-	-	2.00	-	1.00	-	2.40	3.00	-	2.60	1.00	1.60	2.80

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

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23MAT11	MATRICES AND CALCULUS	L	T	P	C
	(Common to B.E./B.Tech. all Branches)	3	1	0	4

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT-I **MATRICES** **9+3**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications : Stretching of an elastic membrane.

UNIT-II **DIFFERENTIAL CALCULUS** **9+3**

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules(sum, product, quotient, chain rules) - Implicit differentiation - Applications : Maxima and Minima of functions of one variable.

UNIT-III **FUNCTIONS OF SEVERAL VARIABLES** **9+3**

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications : Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

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UNIT-IV **INTEGRAL CALCULUS** **9+3**

Definite and Indefinite integrals - Substitution rule - Techniques of Integration : Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Improper integrals - Applications : Hydrostatic force and pressure, moments and centre of mass.

UNIT-V **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 and triple integrals – Applications: Moments and centre of mass, moment of inertia.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to :

CO1: Use the matrix algebra methods for solving practical problems.

CO2: Apply differential calculus tools in solving various application problems.

CO3: Use differential calculus ideas on several variable functions.

CO4: Apply different methods of integration in solving practical problems.

CO5: Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOKS :

1. James Stewart, "Calculus : Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2019. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5,7.1 - 7.4 and 7.8].
2. Grewal. B. S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.

REFERENCE BOOKS :

1. Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus", 14th Edition, Pearson India, 2022.
2. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2021.
3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.

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4. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.

CO's – PO's & PSO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PS01	PS02	PS03
CO1	3	3	1	1	-	-	-	2	-	2	3	2	3	2
CO2	3	3	1	1	-	-	-	3	-	2	3	2	3	2
CO3	3	3	1	1	-	-	-	2	-	2	3	2	3	2
CO4	3	3	1	1	-	-	-	2	-	2	3	2	3	2
CO5	3	2	1	1	-	-	-	2	-	2	3	2	3	3
AVG	3.00	2.80	1.00	1.00	-	-	-	2.20	-	2.00	3.00	2.00	3.00	2.20

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

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23PHT11 **ENGINEERING PHYSICS** L T P C

(B.E./B.Tech-Common to all branches) 3 0 0 3

COURSE OBJECTIVES:

- To make the students effectively achieve an understanding of mechanics.
- Provide knowledge of elastic property, thermal property of materials and its applications.
- Impart knowledge of laser and their applications.
- Introduce the essential principles of fiber optics and its applications.
- Equipping the students to successfully understand the importance of quantum physics.

UNIT-I **MECHANICS** **10**

Multi-particle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of the system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia – theorems of M – M.I of a diatomic molecule – torque – rotational dynamics of rigid bodies – rotational energy state of a rigid diatomic molecule – torsional pendulum – double pendulum

UNIT-II **PROPERTIES OF MATTER AND THERMAL PHYSICS** **10**

Elasticity- Hooke's law – stress – strain diagram – Poisson's ratio – Factors affecting elasticity –bending of beams-Bending moment equation – Depression of a cantilever–Young's modulus by uniform bending – I-shaped girders-Modes of heat transfer – thermal conductivity – Newton's law of cooling – Linear heat flow – Lee's disc method – conduction through compound media (series and parallel)

UNIT-III **LASER** **9**

Lasers: Stimulated absorption – Spontaneous emission – Stimulated emission – Population inversion-Einstein's coefficients derivation and their relations – Pumping methods – Types of lasers – Nd:YAG, CO_2 laser, Semiconductor lasers (homojunction & heterojunction) – Industrial and Medical Applications of lasers

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UNIT-IV **FIBER OPTICS** 8

Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle – Types of optical fibres (material, refractive index, mode) – attenuation, dispersion, bending – Fiber optics communication system (qualitative) – Temperature and displacement sensors – fiber optic endoscope

UNIT-V **QUANTUM PHYSICS** 8

Photons and light waves – Electrons and matter waves – Compton effect: theory of scattering –Derivation and experimental verification – The Schrodinger equation (Time dependent and time independent forms) – particle in a one-dimensional rigid box for eigen value and eigen function – tunneling (qualitative) – scanning tunneling microscope

TOTAL: 45 PERIODS

COURSE OUTCOME

At the end of the course the students will be able to

CO1: Understand the importance of mechanics.

CO2: Describe the Elastic property of solid materials and thermal conductivity of solids in industrial applications.

CO3: Demonstrate a foundational knowledge in lasers .

CO4: The students will get knowledge on fiber optics.

CO5: Understand the importance of quantum physics.

TEXT BOOKS:

1. D.Kleppner and R.Kolenkow, "An Introduction to Mechanics," McGraw Hill Education (IndianEdition), 2017
2. Arthur Beiser, Shobhit Mahajan, S.Rai Choudhury, "Concepts of Modern Physics," McGraw-Hill (Indian Edition), 2017

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REFERENCE BOOKS:

1. K.Thyagarajan and A.Ghatak, "Lasers: Fundamentals and Applications," Laxmi Publications, (Indian Edition), 2023
2. D.Halliday, R.Resnick and J.Walker, "Principles of Physics," Wiley (Indian Edition), 2021
3. N.Garcia, A.Damask and S.Schwarz, "Physics for Computer Science Students," Springer-Verlag, 2012

E- RESOURCES:

1. https://archive.nptel.ac.in/courses/113/106/113106039/
2. https://vlab.amrita.edu/?sub=1
3. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_ph52
4. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_ph36

CO's- PO's MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	1	1	-	-	-	-	-	-	2	3	1
CO2	3	3	2	1	1	-	-	-	-	-	-	2	3	2
CO3	3	2	2	1	2	-	-	-	-	-	1	3	2	2
CO4	3	2	2	1	2	-	-	-	-	-	1	3	2	2
CO5	3	3	1	1	2	-	-	-	-	-	-	2	3	1
AVG	3	3	2	1	2	-	-	-	-	-	1	2	3	2

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

Chairman
BoS / S&H

23CYT11	ENGINEERING CHEMISTRY (Common to B.E./B.TECH. all Branches)	L T P C 3 0 0 3

COURSE OBJECTIVES:

- To inculcate sound understanding of water quality parameters and water treatment techniques
- To impart knowledge on the basic principles and preparatory methods of nanomaterials
- To introduce the basic concepts and applications of phase rule and composites
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices

UNIT-I **WATER AND ITS TREATMENT** **9**

Water: Sources and impurities, **Water quality parameters:** turbidity, pH, hardness, alkalinity, TDS, COD and BOD. **Desalination of brackish water**: Reverse Osmosis. **Boiler troubles:** Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming & foaming. **Treatment of boiler feed water**: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralisation and zeolite process. **Municipal water treatment:** primary treatment and disinfection (UV, Ozonation, break-point chlorination)

UNIT-II **NANOCHEMISTRY** **9**

Basics: Distinction between molecules, nanomaterials and bulk materials; **Size-dependent properties** (optical, electrical, mechanical and magnetic); **Types of nanomaterials**: Definition, properties and uses of – nanoparticle, nanowire and nanotube. **Preparation of nanomaterials:** sol-gel, solvothermal, laser ablation, electrochemical deposition. **Applications** of nanomaterials with examples in medicine, agriculture, energy, electronics and catalysis.

UNIT-III **PHASE RULE AND COMPOSITES** **9**

Phase rule: Introduction, definition of terms with examples. One component system - water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system – Pattinson's process.

Composites: Introduction: Definition & Need for composites; **Constitution**: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). **Properties and applications of**: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites.

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UNIT-IV **FUELS AND COMBUSTION** **9**

Fuels: Introduction: Classification of fuels; **Coal and coke**: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). **Petroleum and Diesel:** Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil - cetane number; **Solid biofuels, Compressed biogas, Power alcohol and biodiesel.**
Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; **Flue gas analysis** - ORSAT Method. **CO_2 emission and carbon foot print.**

UNIT-V **ENERGY SOURCES AND STORAGE DEVICES** **9**

Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; **Recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries:** Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion-battery; **Electric vehicles-working principles; Fuel cells:** H_2-O_2 fuel cell, microbial fuel cell; **Supercapacitors:** Storage principle, types and examples

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able

CO1: To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
CO2: To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
CO3: To apply the knowledge of phase rule and composites for material selection requirements.
CO4: To recommend suitable fuels for engineering processes and applications.
CO5: To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

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TEXT BOOKS:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.
2. S.S. Dara, "A text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

REFERENCE BOOKS:

1. Shashi Chawla, "A Text Book of Engineering Chemistry", Dhanpar Rai & Co (Pvt.) Ltd, New Delhi, 2011.
2. O.G. Palanna, "Engineering Chemistry", McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Dr. A. Ravikrishnan, "Engineering Chemistry", Sri Krishna Hitech Publishing Company Pvt. Limited, 23rd Edition, 2023.

CO's- PO's MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	1	1	3	-	-	-	-	-	-	-	-
CO2	3	2	1	1	2	2	-	-	-	-	1	-	-	-
CO3	3	3	1	1	1	1	-	-	-	-	-	-	-	-
CO4	3	2	1	1	1	1	-	-	-	-	-	-	-	-
CO5	3	2	2	1	2	2	-	-	-	-	-	-	-	-
AVR	3	2.4	2	1.6	1.4	1.8	-	-	-	-	1	-	-	-

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

Chairman
BoS / S&H

23CST11	PROBLEM SOLVING AND PYTHON PROGRAMMING (Common to: B.E. / B.Tech. all Branches)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To solve problems using computational thinking methods using pseudo code and flowchart
- To understand the fundamentals of algorithmic problem solving basics and strategies
- To define variables data types and error messages
- To learn to solve problems using Python conditionals loops lists tuples and dictionaries to represent complex data
- To understand the functions modules and do input/output with files in Python

UNIT-I COMPUTATIONAL THINKING 8

Introduction - Problem solving and Decomposition - Abstraction - Notations Pseudo code - Flow chart - Programming language

UNIT-II ALGORITHMIC PROBLEM SOLVING 8

Algorithm Implementation - Top down design - Simple strategies for developing algorithms - Iteration - Recursion - Fundamental algorithms - Anticipating and Dealing with Errors

UNIT-III BASICS BUILDING BLOCKS OF PYTHON 9

Variables - Immutable variables - Data types - Operators - Python Reserved Words - Understanding error messages

UNIT-IV CONTROL STATEMENTS AND STRUCTURED TYPES 10

Control Flow - Indenting - if Statement - while Loop - break and continue - for Loop - String - Lists - Tuples - Sets - Dictionaries

UNIT-V FUNCTIONS, MODULES AND FILES 10

Definition - Hiding redundancy - Arguments and return values - Variable Number of Arguments - Scope - Passing Functions to a Function - Mapping Functions in a Dictionary - Lambda function – Recursive Functions - Modules: Standard Modules - OS and SYS modules - User defined Modules - Importing modules – Writing into a File - Reading from a File - File Methods

TOTAL : ~~45 PERIODS~~

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COURSE OUTCOMES:

At the end of the course the students will be able to

- **CO1 :** Develop algorithmic solutions for simple computational problems to develop and execute simple Python programs.
- **CO2 :** Write the Algorithms for problem solving basics and strategies to solve complex problems
- **CO3 :** Compose simple Python programs using to illustrate variables data types and error messages.
- **CO4 :** Represent compound data using Python conditionals loops lists tuples dictionaries for solving problems
- **CO5 :** Create functions modules read and write data from/to files in Python programs.

TEXT BOOKS:

1. R. G. Dromey "How to Solve it by Computer", Pearson Education., 2015
2. Charles Dierbach "Introduction to Computer Science using Python: A Computational Problem- Solving Focus", Wiley India., 2015

REFERENCE BOOKS:

1. John V. Guttag "Introduction to Computation and Programming using Python", The MIT press. 2021 (3rd Edition).
2. Paul Gries, Jennifer Campbell, Jason Montojo "Practical Programming: An Introduction to Computer Science using Python 3", Pragmatic Programmers., 2013 , Second edition
3. Robert Sedgewick, Kevin Wayne, Robert Dondero "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India., 2016
4. Karl Beecher "Computational Thinking - A beginner's guide to problem solving and Programming", BCS Learning &Development., 2017

E-RESOURCES:

1. http://www.flowgorithm.org/
2. https://www.python.org/
3. https://nptel.ac.in/courses/106104074

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	3	3	3	2	-	-	-	-	2	2	3	3	3
CO2	2	3	3	3	2	-	-	-	-	2	-	3	3	3
CO3	2	2	-	2	2	-	-	-	-	1	-	3	3	3
CO4	1	2	-	-	1	-	-	-	-	1	-	2	3	3
CO5	2	2	-	-	2	-	-	-	-	1	2	2	3	3
AVG	**1.8**	**2.4**	**3**	**2.7**	**1.8**	-	-	-	-	**1.4**	**2**	**2.6**	**3**	**3**

1 - low, 2 - medium, 3 - high, '-' - no correlation

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BoS/CSE&IT

23TAT11	HERITAGE OF TAMILS	L	T	P	C
	(B.E./B.Tech-Common to all branches)	1	0	0	1

COURSE OBJECTIVES:

- To understand the Sangam and modern literature of Tamil.
- To learn the heritage of Tamil culture.
- To recognize the various art forms of Tamils.
- To explain the Thinai concept of Tamils.
- To realize the contribution of Tamils to Indian national movement and Indian culture.

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 Modernliterature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT-II **HERITAGE – ROCK ART PAINTINGS TO MODERN ART - SCULPTURE** 3

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

UNIT-III **FOLK AND MARTIAL ARTS** 3

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

UNIT-IV **THINAI CONCEPTS OF TAMILS** 3

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

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UNIT-V **CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE** **3**

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

TOTAL : 15 PERIODS

COURSE OUTCOMES:

At the end of the course the student will be able to

CO1: Gain knowledge about various literatures of Tamil.

CO2: Learn the uniqueness of Tamil cultural heritage.

CO3: Find various art forms of Tamil Nadu.

CO4: Understand the Thinai concepts in Tamil.

CO5: Distinguish the contribution of Tamils to Indian national movement and Indian culture.

TEXT BOOK:

1. Heritage of Tamils, Dr. P. Inthirani, Jai Balaji Publications, Chennai.

REFERENCES:

1. Thamizhaga Varalarum Makkal Panpaadum, Dr. K. K. Pillai, Ulaga Tamizharaichi Niruvanam, Chennai.

E- RESOURCES:

1. https://www.tamilvu.org/

CO's –PO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	1	-	1	-	-	-	-	-
CO2	-	-	-	-	-	1	1	-	1	-	-	-	-	-
CO3	-	-	-	-	-	1	1	-	1	-	-	-	-	-
CO4	-	-	-	-	-	1	1	-	1	-	-	-	-	-
CO5	-	-	-	-	-	1	1	-	1	-	-	-	-	-
AVG	-	-	-	-	-	1	1	-	1	-	-	-	-	-

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

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23TAT11	தமிழர் மரபு	L	T	P	C
	(B.E./B.Tech- அனைத்து பாடப்பிரிவுகளுக்கும் பொதுவானது)	1	0	0	1

பாடநெறி நோக்கங்கள்:

- தமிழின் இலக்கியங்கள் மற்றும் நவீன இலக்கியங்களைப் புரிந்துகொள்ளுதல்.
- தமிழ் கலாச்சார பாரம்பரியத்தைக் கற்றுக்கொள்ளுதல்.
- தமிழர்களின் பல்வேறு கலைவடிவங்களைக் கண்டறிதல்.
- தமிழர்களின் திணைக்கோட்பாடுகளை விளக்குதல்.
- இந்திய சுதந்திர போராட்ட இயக்கங்களுக்கும் இந்திய கலாச்சாரத்திற்குமான தமிழர்களின் பங்களிப்பை உணர்தல்.

அலகு - I **மொழி மற்றும் இலக்கியம்** 3

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமய சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் ஆறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த மதங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு - II **மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை** 3

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

அலகு - III **நாட்டுப்புறக் கலைகள் மற்றும் வீரவிளையாட்டுகள்** 3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு - IV **தமிழர்களின் திணைக் கோட்பாடுகள்** 3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம்

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மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவு, கல்வியும் - சங்ககால நகரங்களும் துறைமுகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு - V **இந்திய தேசிய இயக்கம் மற்றும்** 3

இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிற்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

மொத்தம்: 15 பாடவேளைகள்

பாடநெறி முடிவுகள்:

இப்பாடத்தைப் படிப்பதின் முடிவில் மாணவர்கள்

CO1: தமிழின் பல்வேறு இலக்கியங்களைப் பற்றிய அறிவைப் பெறுவார்கள்

CO2: தமிழ் கலாச்சார பாரம்பரியத்தின் தனித்தன்மையைக் கற்றுக்கொள்வார்கள்

CO3: தமிழகத்தின் பல்வேறு கலைவடிவங்களைக் கண்டறிவார்கள்

CO4: தமிழர்களின் திணைக்கோட்பாடுகளை அறிந்துகொள்வார்கள்

CO5: தமிழ் சுதந்திரப்போராட்ட வீரர்கள் மற்றும் தமிழ் கலாச்சாரத்தை இந்தியாவின் மற்ற பகுதியுடன் ஒப்பிடும் திறனைப் பெறுவார்கள்

பாடநூல்:

1. தமிழர் மரபு, முனைவர் ப. இந்திராணி, ஜெய் பாலாஜி பதிப்பகம், சென்னை.

பார்வை நூல்:

1. தமிழக வரலாறும் மக்கள் பண்பாடும், டாக்டர் கே. கே. பிள்ளை, உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை.

மின் - ஆதாரங்கள்:

1. https://www.tamilvu.org/

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CO's –PO's விவரணையாக்கம்::

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	1	1	-	1	-	-	-	-	-
CO2	-	-	-	-	-	1	1	-	1	-	-	-	-	-
CO3	-	-	-	-	-	1	1	-	1	-	-	-	-	-
CO4	-	-	-	-	-	1	1	-	1	-	-	-	-	-
CO5	-	-	-	-	-	1	1	-	1	-	-	-	-	-
AVG	-	-	-	-	-	1	1	-	1	-	-	-	-	-

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

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		L	T	P	C
23CSL11	**PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY** (Common to: B.E. / B.Tech. all Branches)	0	0	4	2

COURSE OBJECTIVES:

- To understand the problem solving approaches.
- To learn the basic programming constructs in Python.
- To practice various computing strategies for Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python

LIST OF EXPERIMENTS

Note: The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines. The Examination shall not be restricted to the sample experiments listed here.

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

TOTAL : 60 PERIODS

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COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : Develop algorithmic solutions to simple computational problems

CO2 : Develop and execute simple Python programs.

CO3 : Implement programs in Python using conditionals and loops for solving problems.

CO4 : Deploy functions to decompose a Python program.

CO5 : Process compound data using Python data structures and Utilize Python packages in developing software applications.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press, 2021.
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

E-RESOURCES:

1. http://www.flowgorithm.org/
2. https://www.python.org/
3. https://nptel.ac.in/courses/106104074

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	-	-	-	-	2	2	3	3	3
CO2	3	3	3	3	2	-	-	-	-	2	-	3	3	-
CO3	2	2	-	2	2	-	-	-	-	1	-	3	3	3
CO4	1	2	-	-	1	-	-	-	-	1	-	2	3	3
CO5	2	2	-	-	2	-	-	-	-	1	-	2	3	3
AVG	**2.2**	**2.4**	**3**	**3**	**1.8**	**-**	**-**	**-**	**-**	**1.4**	**2**	**2.6**	**3**	**3**

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23PCL11	PHYSICS AND CHEMISTRY LABORATORY	L	T	P	C
	(B.E./B.Tech-Common to all Branches)	0	0	4	2

PHYSICS LABORATORY

(Any Seven Experiments)

COURSE OBJECTIVES:

- Determination of the physical parameters such as young's modulus by Uniform bending method, Non-Uniform bending method, Simple harmonic oscillations of cantilever and rigidity modulus of wire
- To impart knowledge in the determination of the thermal conductivity of a bad conductor by Lee's Disc method and band gap of a semiconductor
- Determination of the wavelength of the laser using grating, numerical aperture and acceptance angle in an optical fiber and width of the groove in an compact disc by using laser
- Determination of the velocity of sound and compressibility of liquids by using ultrasonic interferometer
- Knowledge on the frequency of alternating current using electrically vibrating tuning fork by using Melde's apparatus

LIST OF EXPERIMENTS

1. Determination of Young's modulus by Uniform bending method
2. Determination of Young's modulus by non-uniform bending method
3. Simple harmonic oscillations of cantilever
4. Determination of rigidity modulus of wire and moment of inertia of regular objects – Torsion pendulum
5. Determination of thermal conductivity of a bad conductor – Lee's Disc method
6. Determination of band gap of a semiconductor
7. Determination of the wavelength of the laser using grating
8. a) Determination of numerical aperture and acceptance angle in an optical fiber
   b) Determination of width of the groove in an compact disc by using laser
9. Determination of the velocity of sound and compressibility of liquids by using ultrasonic interferometer
10. Determination of the Particle size using Lycopodium powder.

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TOTAL: 30 PERIODS

COURSE OUTCOMES:

At the end of the Course the students will be able to

CO1: Experiment and determine the physical characteristics of given solid materials using Young's modulus-Uniform bending method, non-uniform bending method, cantilever method and Torsion Pendulum.

CO2: Experiment and determine the thermal conductivity of a bad conductor using Lee's Disc method and band gap energy of a given semiconducting material using Zener diode.

CO3: Experiment and determine the optical property of light sources, acceptance angle of optical fiber and width of the groove in an compact disc using Laser.

CO4: Experiment and determine the velocity of ultrasonic waves using ultrasonic interferometer.

CO5: Experiment and determine the frequency of alternating current using electrically vibrating tuning fork by using Melde's apparatus

TEXT BOOKS:

1. Dr. P. Mani, Engineering Physics Practicals, Dhanam Publications (2022)

CO's – PO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	1	1	-	-	-	-	-	-	-	-	-	-
CO2	3	3	1	1	-	-	-	-	-	-	-	1	1	1
CO3	3	3	1	1	-	-	-	-	-	-	-	2	2	2
CO4	3	3	1	1	-	-	-	-	-	-	-	1	1	1
CO5	3	3	1	1	-	-	-	-	-	-	-	1	1	1
AVG	3	3	1	1	-	-	-	-	-	-	-	1	1	1

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

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CHEMISTRY LABORATORY

(Any Seven Experiments)

COURSE OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as acidity, alkalinity.
- To acquire the knowledge in total hardness and dissolved oxygen and its impacts in industries through experiments
- To understand the impacts of chlorine in water sample through volumetric analysis.
- To induce the students to familiarize with electroanalytical techniques in the determination of impurities in aqueous solutions.
- To determine the amount of metal ions through spectroscopic techniques.

LIST OF EXPERIMENTS

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard.
2. Determination of types and amount of alkalinity in a water sample
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Conductometric titration of barium chloride against sodium sulphate (precipitation titration).
9. Estimation of iron content of the given solution using potentiometer.
10. Estimation of sodium /potassium present in water using a flame photometer.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

At the end of the Course the students will be able to

CO1: Analyse the quality of water samples with respect to their acidity and alkalinity of water samples

CO2: Examine the water quality parameters like total hardness and DO with volumetric

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analysis.

CO3: Learn the permissible limit of chlorine in the given water sample

CO4: Analyse the impurities in solution by electro analytical techniques quantitatively

CO5: Determine the amount of metal ions through spectroscopic techniques.

TEXT BOOKS:

1. "Vogel's Textbook of Quantitative Chemical Analysis", (8th Edition, 2014)
2. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, "Vogel's Textbookof Quantitative Chemical Analysis", (2009)
3.

CO's – PO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1		-	3	3	1	-	-	-	1	2	1
CO2	3	2	2		-	3	3	1	-	-	-	1	2	1
CO3	3	2	1		-	3	3	1	-	-	-	2	2	2
CO4	3	2	2		1	2	1	-	-	-	-	2	3	2
CO5	3	2	1		1	2	1	-	-	-	-	2	2	2
AVG	3	2	1		-	3	2	1	-	-	-	2	2	2

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

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23ENL21	COMMUNICATION LABORATORY (Common to B.E./B.Tech. all Branches)	L T P C 0 0 4 2

COURSE OBJECTIVES:

- To identify varied group discussion skills and apply them to take part in effective discussions in a professional context.
- To analyse concepts and problems and make effective presentations explaining them clearly and precisely.
- To be able to communicate effectively through formal and informal writing.
- To be able to use appropriate language structures to write emails, reports and essays
- To give instructions and recommendations that are clear and relevant to the context

UNIT-I **MAKING COMPARISONS** **12**

Speaking - Role Play Exercises Based on Workplace Contexts- Talking about Competition-Discussing Progress toward Goals- Talking about Experiences- Talking about Events in Life-Discussing Past Events
Writing - Writing Emails (Formal & Semi-Formal)

UNIT-II **EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING** **12**

Speaking - Discussing News Stories – Talking about Frequency- Talking about Travel Problems-Discussing Travel Procedures- Talking about Travel Problems- Making Arrangements-Describing Arrangements- Arrangements Discussing Plans and Decisions-Discussing Purposes and Reasons- Understanding Common Technology Terms
Writing -Writing Different Types of Emails

UNIT-III **PROBLEM SOLVING** **12**

Speaking - Discussing Predictions- Describing the Climate- Discussing Forecasts and Scenarios- Talking about Purchasing- Discussing Advantages and Disadvantages- Making Comparisons- Discussing Likes and Dislikes- Discussing Feelings about Experiences-Discussing Imaginary Scenarios
Writing - Short Essays and Reports- Formal/Semi-Formal letters.

UNIT-IV **CLASSIFICATION AND RECOMMENDATIONS** **12**

Speaking - Discussing The Natural Environment- Describing Systems- Describing Position and Movement Explaining Rules (Example- Discussing Rental Arrangements)-Understanding Technical Instructions.

Writing - Writing Instructions -Writing a Short Article.

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UNIT-V **EXPRESSION** **12**

Reading - Describing Things Relatively-Describing Clothing-Discussing Safety Issues (Making Recommendations) Talking about Electrical Devices-Describing Controlling Actions.

Writing - Job Application (Cover Letter + Curriculum Vitae) – Writing Recommendations.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

At the end of the Course the students will able to

- **CO1:** Speak effectively in group discussions held in a formal/semi formal contexts
- **CO2:** Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable solutions
- **CO3:** Create emails, letters and effective job applications with resume.
- **CO4:** Write critical reports to convey data and information with clarity and precision
- **CO5:** Deliver suitable instructions and recommendations for safe execution of tasks

E-RESOURCES:

- https://www.englishclub.com/speaking/
- https://learnenglish.britishcouncil.org/

CO's-PO's MAPPING :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	3	3	-	3	–	2	3
CO2	-	-	2	-	-	-	-	3	3	-	3	1	3	3
CO3	-	-	-	-	-	-	-	3	3	-	2	–	2	3
CO4	-	-	-	-	-	-	-	3	3	-	3	1	2	3
CO5	-	-	1	-	-	-	1	3	3	-	2	1	2	3
AVG	-	-	1.50	-	-	-	1.00	3.00	3.00	-	2.60	1.00	2.20	3.00

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

Chairman
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23ENT21	PROFESSIONAL ENGLISH – II (Common to B.E./B.Tech. all Branches)	L T P C 2 0 0 2

COURSE OBJECTIVES:

- To engage learners in meaningful language activities to improve their reading and writing skills
- To learn various reading strategies and apply in comprehending documents in professional context
- To help learners understand the purpose, audience, contexts of different types of writing
- To develop analytical thinking skills for problem solving in communicative contexts
- To demonstrate an understanding of job applications and interviews for internship andplacements

UNIT-I **MAKING COMPARISONS** 6

Reading - Reading Advertisements, User Manuals, Brochures Emails.

Writing - Professional Emails, Email Etiquette - Compare and Contrast Essay.
Grammar - Mixed Tenses, Prepositional Phrase.

UNIT-II **EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING** 6

Reading - Reading Longer Technical Texts– Cause and Effect Essays, and Letters / Emailsof Complaint.
Writing - Writing Responses to Complaints
Grammar - Active Passive Voice Transformations, In initive and Gerunds

UNIT-III **PROBLEM SOLVING** 6

Reading - Case Studies, Excerpts from Literary Texts, News Reports etc.
Writing - Letter to the Editor, Checklists, Problem Solution Essay / Argumentative Essay.
Grammar - Error Correction; If Conditional Sentences

UNIT-IV **CLASSIFICATION AND RECOMMENDATIONS** 6

Reading - Newspaper Articles
Writing - Recommendations, Transcoding, Accident Report, Survey Report
Grammar - Reported Speech, Modals.
Vocabulary - Conjunctions- Use of Prepositions

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UNIT-V **EXPRESSION** 6

Reading - Company Pro iles, Statement of Purpose, (SOP), An Excerpt of Interview with Professionals.
Writing - Job / Internship Application – Cover Letter & Resume
Grammar - Numerical Adjectives, Relative Clauses

TOTAL : 30 PERIODS

COURSE OUTCOMES:

At the end of the Course the students will able to

CO1:	Compare and contrast products and ideas in technical texts.
CO2:	Identify and report cause and effects in events, industrial processes through technical texts
CO3:	Analyse problems in order to arrive at feasible solutions and communicate them in the written format
CO4:	Present their ideas and opinions in a planned and logical manner
CO5:	Draft effective resumes in the context of job search.

TEXT BOOKS:

1. Department of English, Anna University, "English for Engineers & Technologists" Orient Blackswan Private Ltd, 2020.
2. Dr.Veena Selvam, Dr.Sujatha Priyadarshini, & CO, Department of English, Anna University, "English for Science & Technology" Cambridge University Press, 2021.

REFERENCE BOOKS:

1. Raman, Meenakshi, Sharma & Sangeeta, "Professional English", Oxford University Press, New Delhi, 2019.
2. Dr. V. Chellammal, "Learning to Communicate", Allied Publishers, New Delhi, 2003
3. V.N. Arora and Laxmi Chandra, "Improve Your Writing", Oxford University Press, NewDelhi, 2001.

E. RESOURCES:

- https://learnenglish.britishcouncil.org/

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CO'S-PO'S MAPPING :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	1	-	-	-	-	1	2	3	-	2	-	2	3
CO2	-	-	-	-	-	1	-	3	3	-	3	1	2	3
CO3	-	1	1	-	-	-	-	3	3	-	3	1	3	3
CO4	-	-	-	-	-	-	-	2	3	-	2	-	2	3
CO5	-	-	-	-	-	-	-	2	3	-	2	1	2	3
AVR	-	1.00	1.00	-	-	1.00	1.00	2.40	3.00	-	2.40	1.00	2.20	3.00

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

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23MAT21	NUMERICAL METHODS AND STATISTICS	L	T	P	C
	(Common to B.E./B.Tech. all Branches)	3	1	0	4

COURSE OBJECTIVES:

- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and differentiation and integration in engineering and technology.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of engineering and statistical quality control.

UNIT-I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting-Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel – Eigen values of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT-II INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9+3

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

UNIT-III NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9+3

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first

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order differential equations.

UNIT-IV **TESTING OF HYPOTHESIS** **9+3**

Sampling distributions - Tests for single mean, proportion and difference of means (Large andsmall samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence ofattributes.

UNIT-V **DESIGN OF EXPERIMENTS** **9+3**

One way and two way classifications - Completely randomized design – Randomized block design -- Latin square design - 2^2 factorial design.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

At the end of the Course the students will be able to

CO1 : Apply the numerical techniques of interpolation in various intervals and differentiation and integration for engineering problems.

CO2 : Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.

CO3 : Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

CO4 : Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO5 : Apply the basic concepts of classifications of design of experiments in the field of agriculture.

TEXT BOOKS:

1. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2023.
2. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2019.

REFERENCE BOOKS:

1. Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
2. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.

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3. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
4 Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, India, 2022.

CO's – PO's & PSO's MAPPING :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PS01	PS02	PS03
CO1	3	3	1	1	1	-	-	2	-	2	3	2	3	2
CO2	3	3	1	1	1	-	-	2	-	2	2	1	3	2
CO3	3	3	1	1	1	-	-	2	-	2	3	2	3	3
CO4	3	3	1	1	1	-	-	2	-	2	3	2	3	2
CO5	3	2	1	1	1	-	-	2	-	3	3	2	2	3
AVG	3.00	2.80	1.00	1.00	1.00	-	-	2.00	-	2.20	2.80	1.80	2.80	2.40

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

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23PHT21	PHYSICS FOR INFORMATION SCIENCE (Common to B.E. CSE, CSE (CS), CSE (AI&ML) B.TECH. IT and B.TECH. AI&DS)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To make the students understand the importance in studying electrical properties of materials.
- To enable the students to gain knowledge in semiconductor physics.
- To instill knowledge on magnetic properties of materials.
- To establish a sound grasp of knowledge on different optical properties of materials, optical displays and applications.
- To inculcate an idea of significance of nano structures, quantum confinement, ensuing nano device applications and quantum computing.

UNIT-I **ELECTRICAL PROPERTIES OF MATERIALS** **9**

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures - electrons in metals – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids.

UNIT-II **SEMICONDUCTOR PHYSICS** **9**

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – variation of Fermi level with temperature and impurity concentration –Hall effect and devices – Ohmic contacts – Schottky diode.

UNIT-III **MAGNETIC PROPERTIES OF MATERIALS** **9**

Magnetic dipole moment – atomic magnetic moments- magnetic permeability and susceptibility - Magnetic material classification: diamagnetism – paramagnetism – ferromagnetism – antiferromagnetism – ferrimagnetism –Domain Theory of ferromagnetism - Hard and soft magnetic materials – examples and uses – Magnetic principle in computer data storage – Magnetic hard disc (Giant Magneto Resistive sensor).

UNIT-IV **OPTICAL PROPERTIES OF MATERIALS** **9**

Classification of optical materials – carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) - photo current in a P-N diode – solar cell - LED – Organic LED – Laser diodes – Optical data storage techniques.

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UNIT-V **NANODEVICES AND QUANTUM COMPUTING** **9**

Introduction - quantum confinement – quantum structures: quantum wells, wires and dots - band gap of nanomaterials. Single electron transistor - Quantum system for information processing - quantum states – classical bits – quantum bits – CNOT gate - quantum gates – advantage of quantum computing over classical computing.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Gain knowledge on classical and quantum electron theories, and energy band structures

CO2: Acquire knowledge on basics of semiconductor physics and its applications in variousdevices

CO3: Get knowledge on magnetic properties of materials and their applications in data storage

CO4: Have the necessary understanding on the functioning of optical materials for optoelectronics

CO5: Understand the basics of quantum structures and their applications and basics of quantumcomputing

TEXT BOOKS:

1. S S.O. Kasap, "Principles of Electronic Materials and Devices", McGraw-Hill Education (Indian Edition), 2020
2. Jasprit Singh, "Semiconductor Devices: Basic Principles", Wiley (Indian Edition), 2007
3. R.Murugesan, Kiruthiga Sivaprasath, "Modern Physics", S.Chand (Indian Edition), 2019

REFERENCE BOOKS:

1. Charles Kittel, "Introduction to Solid State Physics", Wiley India Edition, 2022
2. R.Balasubramaniam, Callister's, "Materials Science and Engineering", Wiley (IndianEdition), 2020

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3. Parag K. Lala, "Quantum Computing: A Beginner's Introduction", McGraw-Hill Education (Indian Edition), 2020
4. B.Rogers, J.Adams and S.Pennathur, "Nanotechnology: Understanding Small Systems", CRC Press, 2015

E- RESOURCES:

1. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_mm63
2. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_mm67
3. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_ph56

CO's- PO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	-	-	-	-	-	2	3	1
CO2	3	1	1	-	-	-	-	-	-	-	-	3	2	2
CO3	3	-	-	1	2	1	1	-	-	-	-	2	2	3
CO4	3	-	2	1	3	1	1	-	-	-	-	3	2	3
CO5	3	2	2	2	2	2	-	-	-	-	-	3	3	2
AVG	3	1	2	1	2	1	1	-	-	-	-	3	2	2

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

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23EET22	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3

Course Objectives:

- To learn the basic concepts of electric circuits and analysis.
- To analyze the magnetic circuits and domestic wiring.
- To understand the basics of working principles and application of electrical machines
- To impart knowledge about analog devices and their characteristics.
- To educate on the fundamental concepts of digital electronics.

UNIT-I	ELECTRICAL CIRCUITS	9

Basic Components of Electric Circuits, Charge, Current, Voltage and Power, Voltage and Current Sources, Ohms Law, Kirchhoff's laws, Series and Parallel Connected Independent Sources, Resistors in Series and Parallel, Voltage division and Current division rule, Mesh current and node voltage methods of analysis.

UNIT-II	MAGNETIC CIRCUITS AND ELECTRICAL INSTALLATIONS	9

Magnetic circuits-definitions-MMF, flux, reluctance, magnetic field intensity, flux density, fringing, self and mutual inductances-simple problems. Domestic wiring , types of wires and cables, earthing, protective devices- switch fuse unit- Miniature circuit breaker-moulded case circuit breaker- earth leakage circuit breaker, safety precautions and First Aid.

UNIT-III	ELECTRICAL MACHINES	9

Construction and Working principle- DC Separately and Self excited Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor.

UNIT-IV	ANALOG ELECTRONICS	9

Resistor, Inductor and Capacitor in Electronic Circuits- PN Junction Diodes, Rectifier , Zener Diode –Characteristics Applications – Bipolar Junction Transistor-Biasing, JFET, SCR, MOSFET,IGBT

UNIT-V	DIGITAL ELECTRONICS	9

Review of number systems, binary codes, error detection and correction codes, Combinational logic - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps (Simple Problems only).

Total Hours	45

COURSE OUTCOMES

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CO's	OUTCOME
CO1	The students will be able to explain circuit's behavior using circuit laws and analyze the mesh analysis and nodal analysis.
CO2	The students will be able to analyze the Magnetic circuits, earthing and wiring.
CO3	The students will be able to understand the working principle and applications of electrical machines.
CO4	The students will be able to analyze the characteristics of analog electronic devices.
CO5	The students will be able to explain the basic concepts of digital electronics.

CO, PO& PSO MAPPING

CO/ PO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	1	-	-	-	-	-	1	-	3	2	1
CO2	3	3	2	2	-	-	-	-	-	1	-	3	3	2
CO3	3	3	3	3	-	-	-	-	-	1	-	3	3	3
CO4	3	3	3	3	-	-	-	-	-	1	-	3	3	3
CO5	3	3	3	2	-	-	-	-	-	1	-	3	3	3
AVG	3	3	2	2	-	-	-	-	-	1	-	3	3	2

Text Books:

1. D P Kothari and I.J Nagarath, "Basic Electrical and Electronics Engineering", McGraw Hill Education (India) Private Limited, Second Edition, 2020
2. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.
3. S.K. Bhattacharya, Basic Electrical Engineering, Pearson Education, 2019
4. James A Svoboda, Richard C. Dorf, Dorf's Introduction to Electric Circuits, Wiley,2018

Reference Books:

1. John Bird, "Electrical Circuit theory and technology", Routledge; 2017
2. Thomas L. Floyd, 'Electronic Devices', 10th Edition, Pearson Education, 2018.
3. Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017
4. Muhammad H.Rashid, "Spice for Circuits and electronics", 4th Edition., Cengage India,2019.
5. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

Online Sources

1. NPTEL Videos

Chairman
BoS / EEE

23MET21	ENGINEERING GRAPHICS (BE/B.Tech-Common to all Branches)	L	T	P	C
		2	0	4	4

Course Objectives:

The main learning objective of this course is to prepare the students for:

- Drawing engineering curves.
- Drawing projection of points, lines and plane surface.
- Drawingprojection of solids and freehand sketching.
- Drawing of sectioned solids and development of surfaces
- Drawing isometric and perspective projections of simple solids.

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

UNIT-I PLANE CURVES **5+12**

Basic Geometrical constructions, Curves used in engineering practices: Conics — 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 above curves.

UNIT-II PROJECTION OF POINTS, LINES AND PLANE SURFACE **6+12**

Principal Planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT-III PROJECTION OF SOLIDS AND FREEHAND SKETCHING **6+12**

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Orthographic projection- Freehand sketching of multiple views from pictorial views of objects.

UNIT-IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES **7+12**

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones.

UNIT-V ISOMETRIC AND PERSPECTIVE PROJECTIONS **6+12**

Principles of isometric projection — isometric scale - Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

TOTAL : 90 PERIODS

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COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Construct the conic curves, involutes and cycloid

CO2: Solve practical problems involving projection of lines, Planes.

CO3: Draw Projection of solids and can draw freehand sketch.

CO4: Draw projection of sectioned solids and development of surfaces

CO5: Draw the isometric and perspective projections.

TEXT BOOKS:

1. K Venugopal, Engineering Drawing and Graphics, Sixth edition, New Age International, 2013.
2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.

REFERENCE BOOKS:

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edit ion, 2019.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017.
3. Luzzader, Warren.J. and Duff, John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4. Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
5. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.

E-RESOURCES:

1. https://archive.nptel.ac.in/courses/112/102/112102304/
2. https://onlinecourses.nptel.ac.in/noc20_me79/preview
3. https://www.youtube.com/watch?v=ANEvQyt3PnU

CO's – PO's& PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1	2	-	2	-	-	-	3	-	2	2	2	-
CO2	3	1	2	-	2	-	-	-	3	-	2	2	2	-
CO3	3	1	2	-	2	-	-	-	3	-	2	2	2	-
CO4	3	1	2	-	2	-	-	-	3	-	2	2	2	-
CO5	3	1	2	-	2	-	-	-	3	-	2	2	2	-
Avg	**3**	**1**	**2**	**-**	**2**	**-**	**-**	**-**	**3**	**-**	**2**	**2**	**2**	**-**

1 - low, 2 - medium, 3 - high, '-' - no correlation

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BoS / Mech

23CST21	PROGRAMMING IN C (for B.E. / B.Tech. - CSE, IT, AIDS, CS, AIML)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the constructs of C Language and to develop C Programs using basic programming constructs.
- To develop C programs using arrays and strings
- To develop modular applications in C using functions
- To develop applications in C using pointers and structures.
- To do input/output and file handling in C.

UNIT-I **BASICS OF C PROGRAMMING** **8**

Introduction to programming paradigms – Applications of C Language - Structure of C program - C programming: Data Types - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/Output statements, Assignment statements – Decision making statements - Switch statement - Looping statements – Preprocessor directives - Compilation process

UNIT-II **ARRAYS AND STRINGS** **9**

Introduction to Arrays: Declaration, Initialization – One dimensional array –Two dimensional arrays - String operations: length, compare, concatenate, copy – Selection sort, linear and binary search.

UNIT-III **FUNCTIONS AND POINTERS** **10**

Modular programming - Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion, Binary Search using recursive functions –Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Parameter passing: Pass by value, Pass by reference.

UNIT-IV **STRUCTURES AND UNION** **10**

Structure - Nested structures – Pointer and Structures – Array of structures – Self referential structures – Dynamic memory allocation - Singly linked list – typedef – Union - Storage classes and Visibility.

UNIT-V **FILE PROCESSING** **8**

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

TOTAL : 45 PERIODS

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COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : Demonstrate knowledge on C Programming constructs and to Develop simple applications in C using basic constructs

CO2 : Design and implement applications using arrays and strings

CO3 : Develop and implement modular applications in C using functions.

CO4 : Develop applications in C using structures and pointers.

CO5 : Design applications using sequential and random access file processing.

TEXT BOOKS:

1. ReemaThareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2015.

REFERENCE BOOKS:

1. Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", Eighth edition, Pearson Education, 2018.
2. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.
3. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.
4. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.
5. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013.

E-RESOURCES:

1. https://www.learn-c.org/

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	1	1	2	-	3	3	1	2	2
CO2	2	3	2	1	2	1	1	2	-	3	2	2	2	2
CO3	3	2	2	1	3	1	1	2	-	3	3	2	2	2
CO4	2	3	3	1	2	2	1	2	-	3	2	2	3	2
CO5	2	2	3	2	1	-	-	2	1	2	2	2	2	2
AVG	**2.2**	**2.4**	**2.4**	**1.2**	**2**	**1.6**	**1**	**2**	**1**	**2.8**	**2.4**	**1.8**	**2.2**	**2**

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23TAT21	TAMILS AND TECHNOLOGY	L	T	P	C
	(Common to B.E./B. Tech. all branches)	1	0	0	1

COURSE OBJECTIVES:

- To understand about weaving and ceramic technology of Tamils.
- To compare the design and constructive technology of Cheras, Cholas, Pallavas and Nayakkars.
- To gain knowledge in various manufacturing technology of Tamils.
- To analyses the agriculture and fishery knowledge of Tamils.
- To learn about scientific Tamil and its usage in online platforms.

UNIT-I **WEAVING AND CERAMIC TECHNOLOGY** 3

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

UNIT-II **DESIGN AND CONSTRUCTION TECHNOLOGY** 3

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

UNIT-III **MANUFACTURING TECHNOLOGY** 3

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

UNIT-IV **AGRICULTURE AND IRRIGATION TECHNOLOGY** 3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu 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.

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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

COURSE OUTCOMES:

At the end of the course the student will be able to

CO1: Relate the weaving ceramic technology of Tamils.

CO2: Understand the knowledge of Tamils in design and construction technology.

CO3: Recognize the manufacturing technology knowledge of Tamils.

CO4: Criticize the agriculture and fishery knowledge of Tamils.

CO5: Apply scientific Tamil in Various online platforms.

TEXT BOOK:

1. Tamils and Technology, Dr. P. Inthirani, Jai Balaji Publications, Chennai.

REFERENCES:

1. Thamizhaga Varalarum Makkal Panpaadum, Dr. K. K. Pillai, Ulaga Tamizharaichi Niruvanam, Chennai.

E- RESOURCES:

1. https://www.tamilvu.org/
2. https://sorkuvai.com/

CO's –PO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	1	1	1	1	-	1	-	-	-
CO2	2	-	-	-	-	2	2	2	2	-	2	-	-	-
CO3	2	-	-	-	-	2	2	2	2	-	2	-	-	-
CO4	1	-	-	-	-	1	1	1	1	-	1	-	-	-
CO5	2	-	-	-	-	2	2	2	2	-	2	1	-	-
AVG	2	-	-	-	-	2	2	2	2	-	2	1	-	-

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

Chairman
BoS / S&H

23TAT21	தமிழரும் தொழில்நுட்பமும்	L	T	P	C
		1	0	0	1

(B.E./B.Tech- அனைத்துப் பாடப்பிரிவுகளுக்கும் பொதுவானது)

பாடநெறி நோக்கங்கள்:

- நெசவு மற்றும் பானைத்தொழில்நுட்பத்தைப் புரிந்து கொள்ளுதல்.
- சேர, சோழ, பல்லவ மற்றும் நாயக்கர்களின் வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பத்தை ஒப்பிடுதல்.
- தமிழர்களின் பல்வேறு உற்பத்தி தொழில்நுட்பத்தைப் பற்றிய அறிவைப் பெறுதல்.
- தமிழர்களின் வேளாண்மை மற்றும் கடல்சார் அறிவைப் பெற்றுக்கொள்ளுதல்.
- அறிவியல் தமிழையும் அதன் இணையப்பயன்பாட்டையும் கற்றல்.

அலகு - I நெசவு மற்றும் பானைத் தொழில்நுட்பம் 3

சங்க காலத்தில் நெசவுத்தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு - II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம் 3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமானப்பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும் கோவில்களும் - சோழர் காலத்து பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக் கலை.

அலகு - III உற்பத்தித் தொழில்நுட்பம் 3

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

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அலகு - IV **வேளாண்மை மற்றும் நீர்பாசனத் தொழில்நுட்பம்** 3

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்

அலகு - V **அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்** 3

அறிவியல் தமிழின் வளர்ச்சி - கணினித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்

மொத்தம்: 15 பாடவேளைகள்

பாடநெறி முடிவுகள் :

இப்பாடத்தைப் படிப்பதின் முடிவில் மாணவர்கள்

CO1: நெசவு மற்றும் பானைத்தொழில்நுட்பத்தை பற்றிப் புரிந்துகொள்வார்கள்

CO2: வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பத்தில் தமிழர்களின் அறிவைப் பெறுவார்கள்

CO3: தமிழர்களின் உற்பத்தி தொழில்நுட்பத்தை கண்டறிவார்கள்

CO4: தமிழர்களின் வேளாண்மை மற்றும் கடல்சார் அறிவைக் குறித்து விவாதிப்பார்கள்.

CO5: பல்வேறு இணையப் பயன்பாடுகளில் அறிவியல் தமிழைப் பயன்படுத்திப்பார்ப்பார்கள்

பாடநூல்:

1. தமிழரும் தொழில்நுட்பமும், முனைவர் ப. இந்திராணி, ஜெய் பாலாஜி பதிப்பகம், சென்னை.

பார்வை நூல்:

1. தமிழக வரலாறும் மக்கள் பண்பாடும், டாக்டர் கே. கே. பிள்ளை, உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை.

மின் -ஆதாரங்கள்:

1. https://www.tamilvu.org/
2. https://sorkuvai.com/

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CO's –PO's விவரணையாக்கம்:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	1	1	1	1	-	1	-	-	-
CO2	2	-	-	-	-	2	2	2	2	-	2	-	-	-
CO3	2	-	-	-	-	2	2	2	2	-	2	-	-	-
CO4	1	-	-	-	-	1	1	1	1	-	1	-	-	-
CO5	2	-	-	-	-	2	2	2	2	-	2	1	-	-
AVG	2	-	-	-	-	2	2	2	2	-	2	1	-	-

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

Chairman
BoS / S&H

23MEL21	ENGINEERING PRACTICES LABORATORY (BE/B.Tech-Common to all Branches)	L	T	P	C
		0	0	4	2

Course Objectives:

- Acquire skills in operating hand tools and instruments. Provide hands on training on common household plumbing work and wood work
- Provide hands on training on welding processes.
- Provide hands on training on various simple machining processes. Making a tray out of metal sheet using sheet metal work.
- Wiring various electrical joints in common household electrical wire network.
- Soldering and testing simple electronic circuits. Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & MECHANICAL)

I) CIVIL ENGINEERING PRACTICES (12)

PLUMBING WORK:

Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components - External thread cutting

WOOD WORK:

Hands-on-exercise: Sawing, Planing and Making joints

II) MECHANICAL ENGINEERING PRACTICES (18)

WELDING WORK:

Fabrication of Models with MS Plate using Arc Welding

BASIC MACHINING WORK:

a) Simple Turning
b) Drilling and Tapping Practice

SHEET METAL WORK:

Model making – Trays and funnels

ASSEMBLING AND DISMANTLING WORK:

Assembling a centrifugal pump

GROUP B (ELECTRICAL & ELECTRONICS)

III) ELECTRICAL ENGINEERING PRACTICES (15)

a) Introduction to switches, fuses, indicators and lamps - Basic switch board wiring 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 using Diac/Triac/quadrac)
g) Study of emergency lamp wiring/Water heater

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BoS / Mech

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:

a) Study elements of smart phone
b) Assembly and dismantle of LED TV
c) Assembly and dismantle of computer/ laptop

TOTAL : 60 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Make a wooden model using carpentry Process.

CO2: Make various shapes using welding processes.

CO3: Make various shapes using manufacturing processes like machining and sheet metal work.

CO4: Wires various electrical joints in common household electrical wire network.

CO5: Solder and test simple electronic circuits. Assemble and test simple electronic components on PCB.

REFERENCE:

1. Manual prepared by the faculty of Civil, Mechanical, Electrical and Electronics and Communication Engineering Department, SVHEC.

E-RESOURCES:

1. https://www.youtube.com/watch?v=GPnQjCrb83Y
2. https://www.youtube.com/watch?v=njwdsMI3PcY

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	-	-	3	-	-	-	-	-	-	-	2	1	1
CO2	3	-	-	3	-	-	-	-	-	-	-	2	1	1
CO3	3	-	-	3	-	-	-	-	-	-	-	2	1	1
CO4	3	-	-	3	-	-	-	-	-	-	-	2	1	1
CO5	3	-	-	3	-	-	-	-	-	-	-	2	1	1
Avg	**3**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**1**

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS / Mech

		L	T	P	C
23CSL21	PROGRAMMING IN C LABORATORY (for B.E. / B.Tech. - CSE, IT, AIDS, CS, AIML)	0	0	4	2

COURSE OBJECTIVES:

- To familiarize with C programming constructs to develop programs in C using basic constructs.
- To develop programs in C using arrays.
- To develop applications in C using strings, pointers, functions.
- To develop applications in C using structures.
- To develop applications in C using file processing.

LIST OF EXPERIMENTS

Note: The lab instructor is expected to design problems based on the topics listed. The Examination shall not be restricted to the sample experiments designed.

1. I/O statements, operators, expressions
2. Decision-making constructs: if-else, goto, switch-case, break-continue
3. Loops: for, while, do-while
4. Arrays: 1D and 2D, Multi-dimensional arrays, traversal
5. Strings: operations
6. Functions: call, return, passing parameters by (value, reference), passing arrays to function.
7. Recursion
8. Pointers: Pointers to functions, Arrays, Strings, Pointers to Pointers, Array of Pointers
9. Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions.
10. Files: reading and writing, File pointers, file operations, random access, processor directives.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : Demonstrate knowledge on C Programming constructs and Develop programs in C using basic constructs

CO2 : Develop programs in C using arrays.

CO3 : Develop applications in C using strings, pointers, functions..

CO4 : Develop applications in C using structures..

CO5 : Develop applications in C using file processing.

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TEXT BOOKS:

1. ReemaThareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2015.

REFERENCE BOOKS:

1. Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", Eighth edition, Pearson Education, 2018.
2. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.
3. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.
4. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.
5. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013.

E-RESOURCES:

1. https://www.learn-c.org/

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	3	3	2	1	1	-	2	1	2	2	2	3	2
CO2	2	2	2	1	1	2	-	2	-	2	2	2	2	2
CO3	2	2	2	2	1	2	-	3	-	3	3	3	2	2
CO4	2	2	3	2	3	2	-	3	-	3	3	3	3	2
CO5	2	2	3	2	1	2	-	2	1	2	2	2	2	2
AVG	**2**	**2.2**	**2.6**	**1.8**	**1.4**	**1.8**	**-**	**2.4**	**1**	**2.4**	**2.4**	**2.4**	**2.4**	**2**

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS/CSE&IT

23ENL11	ENGLISH LABORATORY (Common to B.E./B.Tech. all Branches)	L T P C 0 0 2 1

COURSE OBJECTIVES:

- To improve the communicative competence of learners
- To help learners use language effectively in academic /work contexts
- To develop various listening strategies to comprehend various types of audiomaterials like lectures, discussions, videos etc.
- To build on students' English language skills by engaging them in listening, speaking and grammar learning activities those are relevant to authentic contexts.
- To use language ef iciently in expressing their opinions via various media.

UNIT-I INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION 6

Listening- Listening for General Information-Speci ic Details- Conversation: Introduction to Classmates - Audio / Video (Formal & Informal); Telephone Conversation; Listening to Voicemail & Messages; Listening and Filling a Form.
Speaking- Making Telephone Calls-Self Introduction; Introducing a Friend; - Politeness Strategies- Making Polite Requests, Making Polite Offers, Replying to Polite Requests andOffers- Understanding Basic Instructions (Filling out a Bank Application for Example).

UNIT-II NARRATION AND SUMMATION 6

Listening - Listening to Podcasts, Anecdotes / Stories / Event Narration; Documentaries andInterviews with Celebrities.
Speaking - Narrating Personal Experiences / Events-Talking about Current and Temporary Situations & Permanent and Regular Situations - Describing Experiences and Feelings- Engaging in Small Talk- Describing Requirements and Abilities.

UNIT-III DESCRIPTION OF A PROCESS / PRODUCT 6

Listening - Listen to Product and Process Descriptions; A Classroom Lecture; and Advertisements about Products.
Speaking - Picture Description- Describing Locations in Workplaces- Giving Instruction to Use the Product- Explaining Uses and Purposes- Presenting a Product- Describing Shapes and Sizes and Weights- Talking about Quantities (Large & Small)- Talking aboutPrecautions.

UNIT-IV CLASSIFICATION AND RECOMMENDATIONS 6

Listening – Listening to Technology, Entertainment and Design (TED) Talks; Listening to Lectures - and Educational Videos.
Speaking – Small Talk; Discussing and Making Plans-Talking about Tasks-Talking about Progress- Talking about Positions and Directions of Movement-Talking about Travel Preparations- Talking about Transportation.

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UNIT-V **EXPRESSION** 6

Listening - Listening to Debates/ Discussions; Different Viewpoints on an Issue; and PanelDiscussions.
Speaking - Making Predictions- Talking about a Given Topic-Giving Opinions- Understandinga Website- Describing Processes.

TOTAL : 30 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able

CO1:	To listen to and understand general and complex academic information
CO2:	To listen to and understand different points of view in a discussion
CO3:	To speak luently and accurately in formal and informal communicative contexts
CO4:	To describe products and processes and explain their uses clearly as well as accurately
CO5:	To express their opinions effectively in both formal and informal discussions

E. RESOURCES

- https://www.ted.com/about/programs-initiatives/ted-talks-education
- https://learnenglish.britishcouncil.org/

CO's & PO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	3	3	-	3	–	1	3
CO2	-	-	-	-	-	-	-	3	3	-	3	–	1	3
CO3	-	-	-	-	-	-	1	2	3	-	2	–	2	3
CO4	-	-	-	-	-	-	-	2	3	-	2	1	2	3
CO5	-	-	-	-	-	-	1	3	3	-	2	–	2	3
AVR	-	-	-	-	-	-	1.00	3.00	3.00	-	2.00	1.00	1.60	3.00

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS / S&H

23MDC21	YOGA FOR HUMAN EXCELLENCE (Common to B.E./B.Tech. all Branches)	L T P C 0 0 1 0

UNIT-I **SIMPLIFIED PHYSICAL EXERCISES** **3**

Physical exercises: Hand exercises – Leg exercises. Breathing exercises: Eye exercises – Kapalabathi. Makarasana. Body massages: Acupressure – Relaxation.

UNIT-II **KAYA KALPA** **3**

Kaya Kalpa Exercise – Aswini Mudra – Moola Bandha – Ojas Breath (Kayakalpa Exercise should be learnt directly from the World Community Service Centre.)

UNIT-III **MEDITATION** **3**

Agna. Santhi : Clearence. Thuriya. Thuriyatheetham meditation

UNIT-IV **HUMAN RESOURCES DEVELOPMENT** **3**

Eradication of worries – Bene its of Blessings – Greatness of Friendship – Neutralization of anger - Individual peace and world peace

UNIT-V **YOGASANAS** **3**

Suriya Namaskar, Padmasana, Vajrasana, Sukasana, Chakrasana (side posture), Viruchasana, Bhujangasana, Yoga mudra, Ustrasana, Maha Mudra, Vakkarasana.

TOTAL : 15 PERIODS

TEXT BOOKS:

1. Yoga Practices – I: VISION, Vethathiri Publications.

2. Yogasana – Vethathiri Publications

REFERENCE BOOKS:

1. Simpli ied Physical Exercises – Vethathiri Publications.

2. Sound health through yoga – Dr. K. Chandrasekaran.

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COs-POs-PSOs MAPPING :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	1	2	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	2	-	-	-	-	-	-
CO3	1	-	-	-	-	-	-	3	-	-	-	-	-	-
CO4	-	1	-	-	-	2	1	3	1	1	-	-	-	-
CO5	1	-	-	-	-	1	1	3	-	-	-	-	-	-
1.2	1.00	1.00	-	-	-	1.50	1.00	2.60	1.00	1.00	-	-	-	-

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

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23MAT31	DISCRETE MATHEMATICS	L	T	P	C
	(for B.E. / B.Tech - CSE, IT, AIDS, AIML & Cyber - Security)	3	1	0	4

COURSE OBJECTIVES:

- To extend student's logical and mathematical maturity and ability to deal with abstraction.
- To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.
- To understand the basic concepts of combinatorics and graph theory.
- To familiarize the applications of algebraic structures.
- To understand the concepts and significance of lattices and Boolean algebra which are widely used in computer science and engineering.

UNIT-I **LOGIC AND PROOFS** **9+3**

Propositional logic –Propositional equivalences –Predicates and quantifiers – Nested quantifiers– Rules of inference - Introduction to proofs – Proof methods and strategy.

UNIT-II **COMBINATORICS** **9+3**

Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations–Generating functions–Inclusion and exclusion principle and its applications.

UNIT-III **GRAPHS** **9+3**

Graphs and graph models–Graph terminology and special types of graphs–Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.

UNIT-IV **ALGEBRAIC STRUCTURES** **9+3**

Algebraic systems–Semi groups and monoids – Groups – Subgroups – Homomorphisms– Normal subgroup and cosets – Lagrange's theorem – Definitions and examples of Rings

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and Fields.

UNIT-V **LATTICES AND BOOLEAN ALGEBRA** **9+3**

Partial ordering- Posets - Lattices as posets – Properties of lattices – Lattices as algebraic systems – Sublattices – Direct product and homomorphism – Some special lattices-Boolean algebra-Sub Boolean Algebra - Boolean Homomorphism.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

At the end of the course, students would:

CO1: Have knowledge of the concepts needed to test the logic of a program.

CO2: Apply Mathematical techniques to Prove Arguments/statements/theorems ; define pigeonhole principle and discuss its significance; solve problems using counting techniques and combinatorics.

CO3: Classify graphs by their characteristics, apply graph theory to solve problems in different areas of computer science.

CO4: Genaralize the concept of groups to subgroups, normal subgroups ,Quotient group, Cyclic group and permutation group, Lagrange's theorem, Rings and Fields.

CO5: understand the concept of partially ordered set and properties of partial ordered sets, lattice, semi lattice, distributive lattice, Boolean algebra and properties of Boolean algebra.

TEXT BOOKS:

1. Rosen.K.H.,"DiscreteMathematicsanditsApplications",7th Edition, TataMcw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2017.
2. Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata Mc Graw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

REFERENCE BOOKS:

1. Grimaldi.R.P."Discrete and Combinatorial Mathematics :An Applied Introduction , 5th Edition, Pearson Education Asia, Delhi, 2013.

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2. Koshy.T."Discrete Mathematics with Applications", Elsevier Publications,2006.
3. Lipschutz. S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.

E-RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc23_cs109/preview
2. https://onlinecourses.nptel.ac.in/noc23_cs22/preview
3. https://nptel.ac.in/courses/106106183

CO's – PO's& PSO's MAPPING :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PS01	PS02	PS03
CO1	3	3	2	2	-	-	-	2	-	-	2	2	3	2
CO2	3	3	2	2	-	-	-	2	-	-	2	1	3	2
CO3	3	3	2	2	-	-	-	3	-	-	2	3	3	3
CO4	3	3	2	2	-	-	-	2	-	-	2	2	3	2
CO5	3	2	2	2	-	-	-	2	-	-	2	2	2	2
AVG	3.00	2.80	2.00	2.00	-	-	-	2.20	-	-	2.00	2.00	2.80	2.20

1 - low, 2 - medium, 3 - high, '-' - no correlation.

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23CST31	FOUNDATIONS OF DATA SCIENCE (for B.E./B.Tech – CSE, IT,AIDS,CS and AIML)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the data science fundamentals and process.
- To learn to describe the data for the data science process.
- To learn to describe the relationship between data.
- To utilize the Python libraries for Data Wrangling.
- To present and interpret data using visualization libraries in Python

UNIT-I **INTRODUCTION** **9**

Data Science: Benefits and uses – facets of data - Data Science Process : Overview – Defining research goals – Retrieving data – Data preparation - Exploratory Data analysis – build the model– presenting findings and building applications –Data Mining –Data Warehousing–Basic Statistical descriptions of Data

UNIT-II **DESCRIBING DATA** **9**

Types of Data - Types of Variables -Describing Data with Tables and Graphs – Describing Data with Averages - Describing Variability - Normal Distributions and Standard (z) Scores

UNIT-III **DESCRIBING RELATIONSHIPS** **9**

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 r2 – multiple regression equations – regression towards the mean

UNIT-IV **PYTHON LIBRARIES FOR DATA WRANGLING** **9**

Basics of Numpy arrays – aggregations – computations on arrays – comparisons, masks, boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – Hierarchical indexing – combining datasets – aggregation and grouping – pivot tables

UNIT-V **DATA VISUALIZATION** **9**

Importing Matplotlib – Line plots – Scatter plots – visualizing errors – density and contour plots – Histograms – legends – colors – subplots – text and annotation – customization – three dimensional plotting - Geographic Data with Base map - Visualization with Seaborn.

TOTAL : 45 PERIODS

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COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : Define the data science process

CO2 : Understand different types of data description for data science process

CO3 : Gain knowledge on relationships between data

CO4 : Use the Python Libraries for Data Wrangling

CO5 : Apply visualization Libraries in Python to interpret and explore data

TEXT BOOKS:

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016. (Unit I)
2. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017. (Units II and III)
3. Jake VanderPlas, "Python Data Science Handbook", O'Reilly, 2016. (Units IV and V)

REFERENCE BOOKS:

1. Allen B. Downey, "Think Stats: Exploratory Data Analysis in Python", Green Tea Press,2014.

E-RESOURCES:

1. https://nptel.ac.in/courses/106106179
2. https://nptel.ac.in/courses/106106212

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	1	2	2	-	-	1	1	1	2	2	2	2
CO2	2	1	-	1	1	-	-	2	1	1	2	2	3	1
CO3	2	2	1	2	2	1	-	1	2	1	3	2	2	3
CO4	1	2	2	1	2	-	-	1	1	2	2	3	3	2
CO5	2	2	1	2	2	-	-	1	1	1	2	2	2	2
AVG	**1.8**	**1.8**	**1.3**	**1.7**	**1.8**	**1**	**-**	**1.2**	**1.2**	**1.2**	**2.2**	**2.2**	**2.4**	**2**

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23CST32	DATA STRUCTURES (for B.E. – CSE)	L	T	P	C
		3	0	0	3

COURSE 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 understand sorting, searching and hashing algorithms.
- To apply Tree and Graph structures.

UNIT-I **LISTS** **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 ADT – Radix Sort – Multi lists

UNIT-II **STACKS AND QUEUES** **9**

Stack ADT – Operations – Applications – Balancing Symbols – Evaluating arithmetic expressions- Infix to Postfix conversion–Function Calls–Queue ADT–Operations–Circular Queue–DeQueue – Applications of Queues.

UNIT-III **TREES** **9**

Tree ADT–Tree Traversals-Binary Tree ADT–Expression trees–Binary Search Tree ADT–AVL Trees –Priority Queue (Heaps) – Binary Heap.

UNIT-IV **MULTIWAY SEARCH TREES AND GRAPHS** **9**

B-Tree –B+Tree – Graph Definition – Representation of Graphs – Types of Graph - Breadth-first traversal –Depth-first traversal –– Bi-connectivity – Euler circuits –Topological Sort –Dijkstra's algorithm – Minimum Spanning Tree –Prim's algorithm –Kruskal's algorithm.

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UNIT-V **SEARCHING,SORTING AND HASHING TECHNIQUES** **9**

Searching –Linear Search –Binary Search. Sorting –Bubble sort –Selection sort –Insertion sort – Shell sort –. Merge Sort – Hashing –Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : Define linear and non-linear data structures.

CO2 : Implement linear and non–linear data structure operations.

CO3 : Use appropriate linear/non–linear data structure operations for solving a given problem.

CO4 : Apply appropriate graph algorithms for graph applications.

CO5 : Analyze the various searching and sorting algorithms.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Langsam, Augenstein and Tanenbaum, Data Structures Using C and C++,2ndEdition,Pearson Education, 2015.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, Introduction to Algorithms", Fourth Edition, Mcgraw Hill/ MIT Press, 2022.
3. AlfredV.Aho,Jeffrey D.Ullman, John E.Hopcroft, Data Structures and Algorithms,1st edition,Pearson, 2002.
4. Kruse, Data Structures and Program Design in C,2nd Edition, Pearson Education,2006.

E RESOURCES:

1. https://nptel.ac.in/courses/106102064
2. https://onlinecourses.nptel.ac.in/noc25_cs81/preview

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CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	3	1	2	2	1	-	1	2	1	3	2	1	3
CO2	1	2	1	2	2	-	-	1	1	1	2	2	2	2
CO3	2	3	1	2	3	-	-	1	1	1	2	2	1	2
CO4	2	1	-	1	1	-	-	2	1	1	2	2	3	1
CO5	1	2	1	2	2	1	-	1	2	1	3	2	2	3
AVG	**1.6**	**2.2**	**1**	**1.8**	**2**	**1**	**-**	**1.2**	**1.4**	**1**	**2.4**	**2**	**1.8**	**2.2**

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23CST33	OBJECT ORIENTED PROGRAMMING (for B.E./B.Tech. –CSE, IT,CS,AIML and BME)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand Object Oriented Programming concepts and basics of Java programming language
- To know the principles of packages, inheritance and interfaces
- To develop a java application with threads and generics classes
- To define exceptions and use I/O streams
- To design and build Graphical User Interface Application using JAVAFX

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 AND MULTITHREADING** **9**

Exception Handling basics – Multiple catch Clauses – Nested try Statements – Java's Built-in Exceptions–User defined Exception. Multithreaded Programming: Java Thread Model–Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication-Suspending –Resuming, and Stopping Threads –Multithreading. Wrappers – Auto boxing.

UNIT-IV **I/O, GENERICS, STRING HANDLING** **9**

I/O Basics–Reading and Writing Console I/O– Reading and Writing Files. Generics: Generic Programming – Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations. Strings: Basic String class, methods and String Buffer Class.

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UNIT-V JAVAFX EVENT HANDLING, CONTROLS AND COMPONENTS 9

JAVAFX Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, Toggle Button – Radio Buttons – List View – Combo Box – Choice Box – Text Controls – Scroll Pane. Layouts – Flow Pane – H Box and V Box – Border Pane – Stack Pane – Grid Pane. Menus – Basics – Menu – Menu bars – Menu Item.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Apply the concepts of classes and objects to solve simple problems

CO2: Develop programs using inheritance, packages and interfaces

CO3: Make use of exception handling mechanisms and multithreaded model to solve real world problems

CO4: Build Java applications with I/O packages, string classes ,Collections and generics concepts

CO5: Integrate the concepts of event handling and JavaFX components and controls for Developing GUI based applications

TEXT BOOKS:

1. Herbert Schildt, "Java: The Complete Reference", 11 th Edition, McGraw Hill Education, New Delhi, 2019
2. Herbert Schildt, "Introducing JavaFX 8 Programming", 1 st Edition, McGraw Hill Education, New Delhi, 2015

REFERENCE BOOK:

1. Cay S.Horstmann, "Core Java Fundamentals", Volume1,11thEdition,Prentice Hall,2018.

E-RESOURCES:

1.http://www.delnet.in/

2. https://onlinecourses.nptel.ac.in/noc22_cs43/preview

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CO's–PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	1	3	1	3	-	-	3	2	2	2	3	1	2
CO2	2	1	3	2	1	-	-	2	1	1	3	3	3	2
CO3	3	3	1	2	2	-	-	3	2	1	2	3	1	3
CO4	3	1	2	2	2	-	-	1	2	1	3	3	1	1
CO5	1	1	2	3	2	-	-	3	2	1	2	3	3	3
AVG	**2**	**1.4**	**2.2**	**2**	**2**	**-**	**-**	**2.4**	**1.8**	**1.2**	**2.4**	**3**	**1.8**	**2.2**

1- low,2 -medium,3- high,'-'- no correlation

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23ECI32	DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION (BE/B.Tech-Common to CSE, AI&DS and IT)	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES:

- To analyze and design combinational circuits
- To analyze and design sequential circuits
- To understand the basic structure and operation of a digital computer.
- To study the design of data path unit, control unit for processor and to familiarize with the hazards.
- To understand the concept of various memories and I/O interfacing.

UNIT-I **COMBINATIONAL LOGIC** 9

Combinational Circuits – Karnaugh Map - Analysis and Design Procedures – Binary Adder – Subtractor – Decimal Adder - Magnitude Comparator – Decoder – Encoder – Multiplexers - Demultiplexers

UNIT-II **SYNCHRONOUS SEQUENTIAL LOGIC** 9

Introduction to Sequential Circuits – Flip-Flops – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation - Registers – Counters.

UNIT-III **COMPUTER FUNDAMENTALS** 9

Functional Units of a Digital Computer: Von Neumann Architecture – Operation and Operands of Computer Hardware Instruction – Instruction Set Architecture (ISA): Memory Location, Address and Operation – Instruction and Instruction Sequencing – Addressing Modes, Encoding of Machine Instruction – Interaction between Assembly and High Level Language.

UNIT-IV **DATA PATH AND CONTROL DESIGN** 9

Instruction Execution – Building a Data Path – Designing a Control Unit – Hardwired Control, Microprogrammed Control – Pipelining – Data Hazard – Control Hazards.

UNIT-V **MEMORY AND I/O** 9

Memory Concepts and Hierarchy – Memory Management – Cache Memories: Mapping and Replacement Techniques – Virtual Memory – DMA – I/O – Accessing I/O: Parallel and Serial Interface – Interrupt I/O – Interconnection Standards: USB, SATA

TOTAL: 45 PERIODS

PRACTICAL EXERCISES:

1. Verification of Boolean theorems using logic gates.
2. Design and implementation of combinational circuits using gates for arbitrary functions.
3. Implementation of 4-bit binary adder/subtractor circuits.
4. Implementation of code converters

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5.Implementation of BCD adder, encoder and decoder circuits
6. Implementation of functions using Multiplexers.
7. Implementation of the synchronous counters
8. Implementation of a Universal Shift register.
9. Simulator based study of Computer Architecture

PRACTICAL: 30 PERIODS
TOTAL (45+30): 75 PERIODS

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Design various combinational digital circuits using logic gates.

CO2: Design sequential circuits and analyze the design procedures.

CO3: State the fundamentals of computer systems and analyze the execution of an instruction.

CO4: Analyze different types of control design and identify hazards.

CO5: Identify the characteristics of various memory systems and I/O communication.

TEXT BOOKS:

1.M. Morris Mano, Michael D. Ciletti, "Digital Design : With an Introduction to the Verilog HDL, VHDL, and System Verilog", Sixth Edition, Pearson Education, 2018.

2.David A. Patterson, John L. Hennessy, "Computer Organization and Design, The Hardware/Software Interface", Sixth Edition, Morgan Kaufmann/Elsevier, 2020.

REFERENCE BOOKS:

1.Carl Hamacher, ZvonkoVranesic, SafwatZaky, NaraigManjikian, "Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw-Hill, 2012.

2. William Stallings, "Computer Organization and Architecture – Designing for Performance", Tenth Edition, Pearson Education, 2016.

3. M. Morris Mano, "Digital Logic and Computer Design", Pearson Education, 2016.

E-RESOURCES:

1. NPTEL-Online Courses and Video lectures: https://nptel.ac.in/

CO's – PO's & PSO's MAPPING

CO/ PO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	1	1	1	1	2	2	3	3
CO2	3	3	3	3	2	1	1	1	1	1	2	1	2	2
CO3	3	3	3	3	2	2	1	1	1	1	2	2	3	1
CO4	3	3	3	3	1	1	1	1	1	1	1	1	3	1
CO5	3	3	3	3	1	2	1	1	1	1	1	1	2	1
AVG	3	3	3	3	1.8	1.6	1	1	1	1	1.6	1.4	2.6	1.6

1 -low,2-medium,3-high,'-'-nocorrelation

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23EST31	ENTREPRENEURSHIP AND STARTUP (Common to: B.E / B.Tech. all Branches)	L	T	P	C
		1	0	0	1

Course Objectives:

The main learning objective of this course is to prepare the students :

- To develop a knowledge on basic concepts of entrepreneurship.
- To know about business opportunities and project evaluation criteria.
- To explore the concept of startups, government schemes and other financial institutions support

UNIT-I ENTREPRENEURSHIP CONCEPTS 5

Entrepreneurship-Meaning-Origin-Functions-Factors Affecting Entrepreneurial Growth- - Role of Entrepreneurship in Economic Development- Skills required for an Entrepreneur - Barriers to Entrepreneurship - Stages in Entrepreneurial Process.

UNIT-II PROJECT FORMULATION AND IDENTIFICATION 5

Identification of business opportunities -Project formulation- Project Classification and Identification - Project Objectives - Technical Analysis, Financial Analysis – Environmental Appraisal of Project - EDP Phases - Project Report Preparation.

UNIT-III START UP OPPORTUNITIES AND FINANCE 5

The New Industrial Revolution- Business Start-up - Rise of the startup Economy- Government Initiatives - Government schemes and incentives - Institutional service to entrepreneur - Sources of Finance.

TOTAL : 15 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Enhanced the knowledge of entrepreneurship qualities and skills to startup a business.

CO2: Understand the project classification and prepare a feasibility report.

CO3: Provide vision for the own Start-up and its importance for economic development.

TEXT BOOKS:

1. Gupta C.B and Srinivasan N.P- Entrepreneurial development-Sultan Chand and Sons-Latest edtion.
2. Khanka S.S.-Entrepreneurial Development-S.Chand& Co, RamNagar, New Delhi, Latest edtion.

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REFERENCE BOOKS:

1. Vasant Desai-Project Management and Entrepreneurship-Himalaya Publishing House,2023
2. P.Narayana Reddy – Entrepreneurship Text and Cases- cengage learning.2022
3. Prasanna Chandra- Projects planning, analysis, selection, implementation and review Tata McGraw-Hill Publishing Co, Latest edtion.
4. Donald F.Kuratko- Entrepreneurship theory, process & practice-9th Edition-Cengage Learning,2022.

E-RESOURCES:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	-	1	-	-	-	-	-	-	3	2	2
CO2	2	3	1	3	-	-	-	-	-	-	-	2	1	2
CO3	1	-	3	2	2	-	-	-	-	-	-	1	3	2
Avg	**2**	**2**	**2**	**1.6**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**2**

1. http://nptel.ac.in/courses/122106032/Pdf/7_2.pdf,"Business Plan",Dr.T. J.Kamalanabhan, Indian Institute of Technology Madras.
2. http://www.nptel.ac.in/syllabus/110104049/,"Entrepreneurial Finance", Dr. B.V. Phani, IIT Kanpur.
3. http:// nptel.ac.in/noc20_mg35/ Entrepreneurship and Start up

CO, PO & PSO's MAPPING

1-low, 2-medium, 3- high, '-'-no correction

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23CSL31	DATA SCIENCE LABORATORY (for B.E./B.Tech. – CSE, IT,AIDS,CS and AIML)	L	T	P	C
		0	0	4	2

COURSE OBJECTIVE

- To understand the python libraries for data science
- To understand the basic Statistical and Probability measures for data science.
- To learn descriptive analytics on the benchmark data sets.
- To apply correlation and regression analytics on standard data sets.
- To present and interpret data using visualization packages in Python

LIST OF EXPERIMENTS

1. Download, install and explore the features of NumPy, SciPy, Jupyter, Stats models and Pandas packages.
2. Working with Numpy arrays
3. Working with Pandas data frames
4. Reading data from text files, Excel and the web and exploring various commands for doing descriptive analytics on the Iris data set.
5. Use the diabetes data set from UCI and Pima Indians Diabetes data set for performing the following:
   a. Univariate analysis: Frequency, Mean, Median, Mode, Variance, Standard Deviation, Skewness and Kurtosis.
   b. Bivariate analysis: Linear and logistic regression modeling
   c. Multiple Regression analysis
   d. Also compare the results of the above analysis for the two data sets.
6. Apply and explore various plotting functions on UCI data sets.
   a. Normal curves
   b. Density and contour plots
   c. Correlation and scatter plots
   d. Histograms
   e. Three dimensional plotting
7. Visualizing Geographic Data with Base map

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List of Equipments:(30 Students per Batch)

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

Note: Example data sets like: UCI, Iris, Pima Indians Diabetes etc.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : Make use of the python libraries for data science.

CO2 : Make use of the basic Statistical and Probability measures for data science.

CO3 : Perform descriptive analytics on the benchmark data sets.

CO4 : Perform correlation and regression analytics on standard data sets.

CO5 : Present and interpret data using visualization packages in Python.

E-RESOURCES:

1. https://nptel.ac.in/courses/106106179
2. https://nptel.ac.in/courses/106106212

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	1	-	-	-	1	3	3	3	1	3	2
CO2	3	2	2	3	1	-	-	3	1	3	2	1	3	3
CO3	3	2	1	3	1	-	-	2	1	1	1	3	2	3
CO4	2	3	1	3	-	-	-	2	3	2	3	3	3	1
CO5	1	2	3	1	1	-	-	2	1	3	1	1	3	3
AVG	**1.8**	**2.2**	**1.6**	**1.6**	**1**	**-**	**-**	**2**	**1.8**	**2.4**	**2**	**1.8**	**2.8**	**2.4**

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23CSL32	**DATA STRUCTURES LABORATORY** (for B.E. - CSE)	**L**	**T**	**P**	**C**
		0	0	3	1.5

COURSE OBJECTIVES:

- To demonstrate array implementation of linear data structure algorithms.
- To implement the applications using Stack and Linked list.
- To implement Binary search tree and AVL tree algorithms.
- To implement Dijkstra's and Heap algorithm.
- To implement Sorting, Searching and Hashing algorithms

LIST OF EXPERIMENTS

1. Array implementation of Stack, Queue and Circular Queue ADTs
2. Implementation of Singly Linked List
3. Linked list implementation of Stack and Linear Queue ADTs
4. Implementation of Polynomial Manipulation using Linked list
5. Implementation of Evaluating Postfix Expressions, Infix to Postfix conversion
6. Implementation of Binary Search Trees
7. Implementation of AVL Trees
8. Implementation of Heaps using Priority Queues
9. Implementation of Dijkstra's Algorithm
10. Implementation of Prim's Algorithm
11. Implementation of Linear Search and Binary Search
12. Implementation of Insertion Sort and Selection Sort
13. Implementation of Merge Sort
14. Implementation of Open Addressing (Linear Probing and Quadratic Probing

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO1:Implement Linear data structure algorithms.

CO2: Implement applications using Stacks and Linked lists

CO3:Implement Binary Search tree and AVL tree operations.

CO4: Implement graph algorithms.

CO5:Analyze the various searching and sorting algorithms

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CO's–PO's & PSO's MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	2	2	1	-	-	-	2	1	2	2	2	2	3
CO2	3	3	1	1	-	-	-	1	1	1	3	1	2	2
CO3	2	1	3	1	-	-	-	1	1	2	3	3	3	3
CO4	3	1	3	3	-	-	-	1	2	3	3	2	1	2
CO5	3	2	1	1	2	-	-	3	3	3	1	3	1	3
Avg.	2.4	1.8	2	1.4	2	-	-	1.6	1.6	2.2	2.4	2.2	1.8	2.6

1- low,2 -medium,3- high,'-'- no correlation

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23CSL33	**OBJECT ORIENTED PROGRAMMING LABORATORY** (for B.E./ B.Tech.- CSE,IT,CS and AIML)	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To build software development skills using java programming for real- world applications.
- To understand and apply the concepts of classes, packages, interfaces, inheritance, exception handling and file processing.
- To Implement multithreading, and generics concepts
- To develop applications using generic programming and event handling
- To Implement and deploy web applications using Java

LIST OF EXPERIMENTS

Note: The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines. The Examination shall not be restricted to the sample experiments listed here.

1. Solve problems by using sequential search, binary search, and quadratic sorting algorithms(selection, insertion)
2. Develop stack and queue data structures using classes and objects.
3. Develop a java application with an Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of
4. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area( ) that prints the area of the given shape.
5. Solve the above problem using an interface Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
6. Implement exception handling and creation of user defined exceptions.
7. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.
8. Write a program to perform file operations.

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9. Develop applications to demonstrate the features of generics classes.
10. Develop applications using Java FX controls, layouts and menus.
11. Develop a mini project for any application using Java concepts.

Lab Requirements: for a batch of 30 students

Operating Systems: Linux / Windows

Front End Tools: Eclipse IDE/ Net beans IDE

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Design and develop java programs using object oriented programming concepts

CO2: Develop simple applications using object oriented concepts such as package, exceptions

CO3: Implement multithreading, and generics concepts

CO4: Create GUIs and event driven programming applications for real world problems.

CO5: Implement and deploy web applications using Java

CO's–PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	2	1	-	-	-	1	2	2	2	1	2	3
CO2	2	1	3	1	-	-	-	2	3	3	2	1	3	1
CO3	2	2	1	2	1	-	-	1	2	1	3	2	3	2
CO4	2	2	1	3	-	-	-	3	1	1	1	2	1	2
CO5	1	3	3	1	3	-	-	1	1	1	1	2	1	2
AVG	**1.8**	**1.8**	**2**	**1.6**	**2**	**-**	**-**	**1.6**	**1.8**	**1.6**	**1.8**	**1.4**	**2**	**2**

1- low,2 -medium,3- high,'-'- no correlation

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23CRT41	DATABASE MANAGEMENT SYSTEMS AND SECURITY for B.E-CSE(Cyber Security)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn the fundamentals of data models, conceptualize and depict a database system using ER diagram.
- To study the principles to be followed to create an effective relational database and write SQL queries to store/retrieve data to/from database systems.
- To know the fundamental concepts of transaction processing, concurrency control techniques and recovery procedure.
- To understand the need of security in Database Management systems
- To learn how to secure Database Management systems

UNIT-I **RELATIONAL DATABASES** **9**

Data Models – Relational Data Models – Relational Algebra – Structured Query Language –Entity-Relationship Model – Mapping ER Models to Relations – Distributed Databases – Data Fragmentation – Replication

UNIT-II **DATABASE DESIGN** **9**

ER Diagrams – Functional Dependencies – Non-Loss Decomposition Functional Dependencies – First Normal Form – Second Normal Form – Third Normal Form – Dependency Preservation – Boyce/Codd Normal Form – Multi-Valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

UNIT-III **TRANSACTION MANAGEMENT** **9**

Transaction Concepts – ACID Properties – Serializability – Transaction Isolation Levels – Concurrency Control – Need for Concurrency – Lock-Based Protocols – Deadlock Handling – Recovery System – Failure Classification – Recovery Algorithm.

UNIT-IV **DATABASE SECURITY** **9**

Need for database security – SQL Injection Attacks – The Injection Technique – SQLi Attack Avenues and Types

UNIT-V **ACCESS CONTROL AND ENCRYPTION** **9**

Database Access Control – SQL based access definition – Cascading Authorizations – Role- based access control – Inference – Database encryption

TOTAL : 45 PERIODS

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COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : Model an application's data requirements using conceptual modeling and design database schemas based on the conceptual model.

CO2 : Formulate solutions to a broad range of query problems using relational algebra/SQL

CO3 : Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.

CO4 : Run transactions and estimate the procedures for controlling the consequences of concurrent data access.

CO5 : Understand and handle security issues in database management systems

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Seventh Edition, Tata McGraw Hill, 2021.
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2016.
3. William Stallings, Lawrie Brown, "Computer Security: Principles and Practice", Fourth Edition, Pearson, 2019.

REFERENCE BOOKS:

1. C.J. Date, A. Kannan and S. Swamynathan, "An Introduction to Database Systems", Pearson Education, Eighth Edition, 2006.
2. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", Third Edition, McGraw Hill, 2014.
3. Narain Gehani and Melliyal Annamalai, "The Database Book: Principles and Practice Using the Oracle Database System", Universities Press, 2012.

E-RESOURCES:

https://onlinecourses.nptel.ac.in/noc22_cs91/preview

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	2	2	1	1	-	1	2	-	2	2	3	2	-
CO2	1	2	2	1	1	-	1	2	-	3	2	3	3	-
CO3	2	1	2	1	2	-	2	1	-	3	3	3	3	-
CO4	2	2	3	2	1	-	2	2	-	3	2	3	3	-
CO5	2	2	3	2	2	-	1	2	2	3	3	3	3	-
AVG	**2**	**2**	**2**	**1**	**1**	**-**	**1**	**2**	**2**	**3**	**2**	**3**	**3**	**-**

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23CST42	THEORY OF COMPUTATION (for B.E./B.Tech. –CSE, IT,CS and AIML)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand foundations of computation including automata theory
- To construct models of regular expressions and languages.
- To design context free grammar and pushdown automata
- To understand Turing machines and their capability
- To understand Un decidability and NP class problems

UNIT-I AUTOMATA AND REGULAR EXPRESSIONS 9

Need for automata theory - Introduction to formal proof – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Equivalence between NFA and DFA – Finite Automata with Epsilon transitions – Equivalence of NFA and DFA- Equivalence of NFAs with and without ε-moves- Conversion of NFA into DFA – Minimization of DFAs.

UNIT-II REGULAR EXPRESSIONS AND LANGUAGES 9

Regular expression – Regular Languages- Equivalence of Finite Automata and regular expressions– Proving languages to be not regular(Pumping Lemma)–Closure properties of regular languages.

UNIT-III CONTEXT FREE GRAMMAR AND PUSHDOWN AUTOMATA 9

Types of Grammar - Chomsky's hierarchy of languages -Context-Free Grammar (CFG) and Languages – Derivations and Parse trees – Ambiguity in grammars and languages – Push Down Automata (PDA): Definition – Moves - Instantaneous descriptions -Languages of pushdown automata–Equivalence of push down automata and CFG-CFG to PDA-PDA to CFG–Deterministic Pushdown Automata

UNIT-IV NORMAL FORMS AND TURING MACHINES 9

Normal forms for CFG–Simplification of CFG-Chomsky Normal Form(CNF) and Greibach Normal Form (GNF) – Pumping lemma for CFL – Closure properties of Context Free Languages – Turing Machine : Basic model – definition and representation – Instantaneous Description – Language acceptance by TM – TM as Computer of Integer functions – Programming techniques for Turing machines (subroutines).

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UNIT-V **UNDECIDABILITY** **9**

Unsolvable Problems and Computable Functions–PCP-MPCP-Recursive and recursively Enumerable languages–Properties-Universal Turing machine- Tractable and Intractable problems-P and NP completeness–Kruskal's algorithm–Travelling SalesmanProblem-3-CNFSATproblems.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Construct automata theory using Finite Automata

CO2: Write regular expressions for any pattern

CO3: Design context free grammar and Push down Automata

CO4: Design Turing machine for computational functions

CO5: Differentiate between decidable and un decidable problems

TEXT BOOKS:

1. Hopcroft J.E., Motwani R. & Ullman J.D., "Introduction to Automata Theory, Languages and Computations", 3rd Edition, Pearson Education, 2008.
2. John C Martin,"Introduction to Languages and the Theory of Computation",4thEdition,Tata McGraw Hill, 2011.

REFERENCE BOOKS:

1. Harry R Lewis and Christos H Papadimitriou , "Elements of the Theory of Computation", 2nd Edition, Prentice Hall of India, 2015.
2. PeterLinz,"An Introduction to Formal Language and Automata",6thEdition,Jones & Bartlett, 2016.
3. K.L.P.Mishra and N.Chandrasekaran, "Theory of Computer Science: Automata Languages and Computation", 3rd Edition, Prentice Hall of India, 2006.

E-RESOURCES:

1. https://nptel.ac.in/courses/106104028
2. https://nptel.ac.in/courses/106106242

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CO's–PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	3	2	3	-	-	-	1	1	2	3	1	3	2
CO2	2	2	3	2	1	-	-	3	3	2	3	3	1	2
CO3	2	2	3	2	1	-	-	1	3	1	2	1	2	2
CO4	2	2	2	1	-	-	-	1	3	3	2	1	3	2
CO5	2	2	2	1	1	-	-	1	1	3	2	3	1	3
AVG	**1.8**	**2.2**	**2.4**	**1.8**	**1**	**-**	**-**	**1.4**	**2.2**	**2.2**	**2.4**	**1.8**	**2**	**2.2**

1- low,2 -medium,3- high,'-'- no correlation

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23CRI41	OPERATING SYSTEM AND SECURITY for B.E-CSE(Cyber Security)	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES:

- To understand the basic concepts of Operating Systems.
- To explore the process management concepts including scheduling, synchronization, threads and deadlock.
- To understand the memory, file and I/O management activities of OS.
- To understand the requirements of a trust model.
- To learn how security is implemented in various operating systems.

UNIT-I **OPERATING SYSTEM OVERVIEW** **9**

Computer-System Organization – Architecture – Operating-System Operations – Resource Management – Security and Protection – Distributed Systems – Kernel Data Structures – Operating-System Services – System Calls – System Services – Why Applications Are Operating-System Specific – Operating-System Design and Implementation - Operating-System Structure – Building and Booting an Operating System.

UNIT-II **PROCESS MANAGEMENT** **9**

Process Concept – Process Scheduling – Operation on Processes, Inter-process Communication – Threads – Overview – Multithreading models – Threading issues; CPU Scheduling – Scheduling criteria, Scheduling algorithms; Process Synchronization – critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Critical regions, Monitors; Deadlock – System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Detection, Recovery.

UNIT-III **MEMORY MANAGEMENT AND FILE SYSTEMS** **9**

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation – Virtual Memory – Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory. Mass Storage system - HDD Scheduling - File concept, Access methods, Directory Structure, Sharing and Protection; File System Structure, Directory implementation, Allocation Methods, Free Space Management

UNIT-IV **SECURE SYSTEMS AND VERIFIABLE SECURITY GOALS** **9**

Security Goals – Trust and Threat Model – Access Control Fundamentals – Protection System – Reference Monitor – Secure Operating System Definition – Assessment Criteria – Information Flow – Information Flow Secrecy Models – Denning's Lattice Model – Bell LaPadula Model – Information Flow Integrity Models – Biba Integrity Model – Low-Water Mark Integrity – Clark- Wilson Integrity.

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UNIT-V **SECURITY IN OPERATING SYSTEMS** **9**

UNIX Security – UNIX Protection System – UNIX Authorization – UNIX Security Analysis – UNIX Vulnerabilities – Windows Security – Windows Protection System – Windows Authorization – Windows Security Analysis – Windows Vulnerabilities – Address Space Layout Randomizations – Retrofitting Security into a Commercial Operating System – Introduction to Security Kernels.

TOTAL : 45 PERIODS

PRACTICAL EXERCISES:

1. Basics of UNIX commands, Understand and practice Linux permissions, special permissions and authentication (various options of chmod, setuid, setgid)
2. Write programs using the following system calls of UNIX operating system
   a) fork, exec, getpid, exit, wait, close, stat, opendir, readdir
3. Write C programs to implement the various CPU Scheduling Algorithms
4. Implementation of Semaphores
5. Implementation of Shared memory
6. Bankers Algorithm for Deadlock Detection &Avoidance
7. Implementation of the following Memory Allocation Methods for fixed partition
   a) First Fit b) Worst Fit c) Best Fit
8. Implementation of the following Page Replacement Algorithms
   a) FIFO b) LRU c) LFU
9. Program to demonstrate the working of Bell LaPadula Model and Biba Integrity Model
10. Setting up access control lists of files and directories and testing the lists in Linux
11. Learn to enable and disable address space layout randomization

TOTAL: 30 PERIODS
TOTAL: 75 (45+30) PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : To gain understanding on the concepts of Operating Systems.

CO2 : To acquire knowledge on process management concepts including scheduling, synchronization, threads and deadlock.

CO3 : To have understanding on memory, file and I/O management activities of OS

CO4 : To understand security issues in operating systems and appreciate the need for security models

CO5 : To gain exposure to the operating systems security models of WINDOWS and UNIX OS.

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TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley & Sons, Inc., 10th Edition, 2021.
2. Trent Jaeger, Operating System Security, Morgan & Claypool Publishers series, 2008.

REFERENCE BOOKS:

1. Morrie Gasser, "Building A Secure Computer System", Van Nostrand Reinhold, New York, 1988.
2. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.
3. William Stallings, "Operating Systems – Internals and Design Principles", 9th Edition, Pearson, 2017.
4. Michael Palmer, "Guide to Operating Systems Security", Course Technology – Cengage Learning, New Delhi, 2008.
5. Introduction to Hardware, Security and Trust, book by Mohammad Tehranipoor, Cliff Wang, Springer, 2012.
6. Gary McGraw, Software Security: Building Security In, Addison Wesley software security series, 2005.
7. Gerardus Blokdyk, Security Focused Operating System A Complete Guide - 2020 Edition, 5STARCooks, ISBN: 9781867373353, 2020.

E-RESOURCES:

https://www.geeksforgeeks.org/operating-systems/operating-system-security/

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	1	1	1	2	3	2	3	-
CO2	3	3	3	3	2	1	1	1	1	2	3	1	2	-
CO3	3	3	3	3	2	2	1	1	1	2	3	2	3	-
CO4	3	3	3	3	1	1	1	1	1	1	2	1	3	-
CO5	3	3	3	3	1	2	1	1	1	1	2	1	2	-
AVG	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**1**	**2**	**2**	**3**	**2**	**3**	-

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23CSI42	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (for B.E./B.Tech. –CSE, IT,CS and BME)	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES:

- Study about uninformed and Heuristic search techniques.
- Learn techniques for reasoning under uncertainty
- Introduce Machine Learning and supervised learning algorithms
- Study about ensembling and unsupervised learning algorithms
- Learn the basics of deep learning using neural networks

UNIT-I PROBLEM SOLVING 9

Introduction to AI - AI Applications - Problem solving agents – search algorithms – uninformed search strategies – Heuristic search strategies – Local search and optimization problems – adversarial search – constraint satisfaction problems (CSP).

UNIT-II PROBABILISTIC REASONING 9

Acting under uncertainty – Bayesian inference – naïve bayes models. Probabilistic reasoning– Bayesian networks – exact inference in BN–approximate inference in BN – causal networks.

UNIT-III SUPERVISED LEARNING 9

Introduction to machine learning–Linear Regression Models : Least squares, single & multiple variables, Bayesian linear regression, gradient descent, Linear Classification Models: Discriminant function – Probabilistic discriminative model - Logistic regression, Probabilistic generative model – Naive Bayes, Maximum margin classifier – Support vector machine, Decision Tree, Random forests.

UNIT-IV ENSEMBLE TECHNIQUES AND 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-V NEURAL NETWORKS 9

Perceptron - Multilayer perceptron, activation functions, network training – gradient descent optimization – stochastic gradient descent, error back propagation, from shallow networks to deep networks –Unit saturation (akathe vanishing gradient problem) – ReLU, hyper parameter tuning, batch normalization, regularization, dropout.

TOTAL:45 PERIODS

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PRACTICAL EXERCISES:

1. Implementation of Uninformed search algorithms (BFS,DFS)
2. Implementation of Informed search algorithms (A*,memory-boundedA*)
3. Implement naïve Bayes models
4. Implement Bayesian Networks
5. Build Regression models
6. Build decision trees and random forests
7. Build SVM models
8. Implement ensembling techniques
9. Implement clustering algorithms
10. Implement EM for Bayesian networks
11. Build simple NN models
12. Build deep learning NN models

TOTAL:30 PERIODS
TOTAL:75(45+30)PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : Use appropriate search algorithms for problem solving

CO2 : Apply reasoning under uncertainty

CO3 : Build supervised learning models

CO4 : Build ensembling and unsupervised models

CO5 : Build ensembling and unsupervised models

TEXT BOOKS:

1. Stuart Russell and Peter Norvig," Artificial Intelligence–A Modern Approach", Fourth Edition, Pearson Education,2021.
2. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Fourth Edition,2020.

REFERENCE BOOKS:

1. DanW.Patterson,"Introduction to Artificial Intelligence and Expert Systems", Pearson Education, 2007
2. Kevin Night, Elaine Rich, and NairB.,"Artificial Intelligence",McGrawHill,2008.
3. Patrick H. Winston," Artificial Intelligence", Third Edition, Pearson Education,2006.
4. Deepak Khemani, "Artificial Intelligence", Tata McGraw Hill Education, 2013

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E-RESOURCES:

1. https://nptel.ac.in/courses/106106226
2. https://nptel.ac.in/courses/106106139

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	3	3	-	-	-	1	3	3	3	1	2	2
CO2	1	1	1	3	1	-	-	1	2	1	3	2	3	2
CO3	2	1	2	1	1	-	-	2	1	1	3	1	1	1
CO4	3	1	3	1	-	-	-	2	1	2	1	2	2	2
CO5	3	1	1	2	2	-	-	3	1	2	3	2	1	2
AVG	**2.4**	**1.2**	**2**	**2**	**1.3**	**-**	**-**	**1.8**	**1.6**	**1.8**	**2.6**	**1.6**	**1.8**	**1.8**

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23CYT41 ENVIRONMENTAL SCIENCES AND SUSTAINABILITY **L T P C**
(Common to B.E./B.Tech. all Branches)
2 0 0 2

COURSE OBJECTIVES:

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and nonrenewable resources, causes of their degradation and measures to preserve them.
- To familiarize the concept of sustainable development goals and sustainable practices
- To imbibe awareness on population issues and manmade activities

UNIT-I ENVIRONMENT AND BIODIVERSITY **6**

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity – values of biodiversity, India as a mega-diversity nation – threats to biodiversity – conservation of biodiversity.
Activity: Documentation of ecosystems/Biodiversity within Campus.

UNIT-II ENVIRONMENTAL POLLUTION **6**

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts.
Activity: Documentation of pollution issues in Erode district.

UNIT-III RENEWABLE SOURCES OF ENERGY **6**

Energy management and conservation - New Energy Sources: Need and different types of new energy sources. Concept, origin and applications of - Hydrogen energy, Ocean energy, Tidal energy and geothermal energy conversion.
Activity: Documentation of available renewable resources in Erode district.

UNIT-IV SUSTAINABILITY AND MANAGEMENT **6**

Development, GDP, Sustainability- concept, needs and challenges - Sustainable Development Goals - Concept of Carbon Credit, Carbon Footprint. Circular economy, ISO 14000 Series, Material Life Cycle Assessment, Environmental Impact Assessment. Green Engineering.
Activity: Documentation of sustainable goals of Tamilnadu. **Case Study:** E-Waste Management

UNIT-V HUMAN POPULATION AND DISASTER MANAGEMENT **6**

Population growth, Population explosion— Family Welfare Program – Environment and human health. Human rights – HIV/AIDS – Women and Child Welfare – Role of Information Technology in environment and human health – Disaster management: Floods, earthquake, cyclone and landslides.
Activity: Documentation of women development schemes in Tamilnadu.

TOTAL HOURS 30

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COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.

CO2 : To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.

CO3 : To identify and apply the understanding of renewable and non-renewable resources

CO4 : To recognize the different goals of sustainable development and sustainability practices and apply them for future development.

CO5 : To aware the population issues and to handle the disaster issues

TEXT BOOKS:

1. Dr. A.Ravikrishnan "Environmental Sciences and Sustainability", 2nd Edition, Sri Krishna Hitech Publishing Company Pvt. Ltd, 2022.

2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2010.

3. Gilbert M.Masters & Wendell P Ela, 'Introduction to Environmental Engineering and Science', 3rd edition, Prentice – Hall of India Pvt. Ltd, New Delhi, 2008.

REFERENCE BOOKS:

1. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2009.

2. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, Third Edition, 2022.

3. Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2023.

ONLINE SOURCES:

Unit 1: https://www.youtube.com/watch?v=Ar04qG1P8Es (IIT ROORKEE NPTEL) & https://www.youtube.com/watch?v=SHxAOoxhKTA (IIT KANPUR NPTEL)
Unit 2: https://www.youtube.com/watch?v=I7Z34WU257U (IIT ROORKEE NPTEL)
Unit 3: https://www.youtube.com/watch?v=1kUE0BZtTRc (NATIONAL GEOGRAPHIC)
Unit 4: https://www.youtube.com/watch?v=Crd3CFq5B4s (IITM NPTEL)
Unit 5: https://www.youtube.com/watch?v=sMqtwbKc8EA (FINANCIAL TIMES)

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CO's & PO's MAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	1	-	-	-	3	-	-	-	-	2
CO2	3	2	-	-	-	3	-	-	-	-	2
CO3	3	-	1	-	-	2	-	-	-	-	2
CO4	3	2	1	1	-	2	-	-	-	-	2
CO5	3	2	1	-	-	2	-	-	-	-	1
AVG	3	2	1	1		2					2

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23CRI42	ENGINEERING SECURE SOFTWARE SYSTEMS for B.E-CSE(Cyber Security)	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

- Know the importance and need for software security.
- Know about various attacks.
- Learn about secure software design.
- Understand risk management in secure software development.
- Know the working of tools related to software security.

UNIT-I NEED OF SOFTWARE SECURITY AND LOW-LEVEL ATTACKS 6

Software Assurance and Software Security - Threats to software security - Sources of software insecurity - Benefits of Detecting Software Security - Properties of Secure Software – Memory-Based Attacks: Low-Level Attacks Against Heap and Stack - Defense Against Memory-Based Attacks.

UNIT-II SECURE SOFTWARE DESIGN 7

Requirements Engineering for secure software - SQUARE process Model – Requirements elicitation and prioritization- Isolating The Effects of Untrusted Executable Content – Stack Inspection – Policy Specification Languages – Vulnerability Trends – Buffer Overflow – Code Injection - Session Hijacking. Secure Design - Threat Modeling and Security Design Principles.

UNIT-III SECURITY RISK MANAGEMENT 5

Risk Management Life Cycle – Risk Profiling – Risk Exposure Factors – Risk Evaluation and Mitigation – Risk Assessment Techniques – Threat and Vulnerability Management.

UNIT-IV SECURITY TESTING 8

Traditional Software Testing – Comparison - Secure Software Development Life Cycle – Risk Based Security Testing – Prioritizing Security Testing With Threat Modeling – Penetration Testing– Planning and Scoping - Enumeration – Remote Exploitation – Web Application Exploitation -Exploits and Client Side Attacks – Post Exploitation – Bypassing Firewalls and Avoiding Detection- Tools for Penetration Testing.

UNIT-V SECURE PROJECT MANAGEMENT 4

Governance and security - Adopting an enterprise software security framework - Security and project management - Maturity of Practice.

TOTAL : 30 PERIODS

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PRACTICAL EXERCISES:

1. Implement the SQL injection attack.
2. Implement the Buffer Overflow attack.
3. Implement Cross Site Scripting and Prevent XSS.
4. Perform Penetration testing on a web application to gather information about the system, then initiate XSS and SQL injection attacks using tools like Kali Linux.
5. Develop and test the secure test cases
6. Penetration test using kali Linux

TOTAL: 30 PERIODS
TOTAL: 60 (30+30) PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : Identify various vulnerabilities related to memory attacks

CO2 : Apply security principles in software development.

CO3 : Evaluate the extent of risks.

CO4 : Involve selection of testing techniques related to software security in the testing phase of software development.

CO5 : Use tools for securing software

TEXT BOOKS:

1. Julia H. Allen, "Software Security Engineering", Pearson Education, 2008.
2. Evan Wheeler, "Security Risk Management: Building an Information Security Risk Management Program from the Ground Up", First edition, Syngress Publishing, 2011.
3. Chris Wysopal, Lucas Nelson, Dino Dai Zovi, and Elfriede Dustin, "The Art of Software Security Testing: Identifying Software Security Flaws (Symantec Press)", Addison-Wesley 2006.

REFERENCE BOOKS:

1. Robert C. Seacord, "Secure Coding in C and C++ (SEI Series in Software Engineering)", Addison-Wesley Professional, 2005.
2. Jon Erickson, "Hacking: The Art of Exploitation", 2nd Edition, No Starch Press, 2008.
3. Mike Shema, "Hacking Web Apps: Detecting and Preventing Web Application Security Problems", First edition, Syngress Publishing, 2012
4. Bryan Sullivan and Vincent Liu, "Web Application Security, A Beginner's Guide", Kindle Edition, McGraw Hill, 2012.
5. Lee Allen, "Advanced Penetration Testing for Highly-Secured Environments: The Ultimate

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Security Guide (Open Source: Community Experience Distilled)", Kindle Edition, Packt Publishing,2012

6. Jason Grembi, "Developing Secure Software.

E-RESOURCES:

https://pkklib.iitk.ac.in/index.php/resources/e-books/e-text-books/49104:engineering-secure-software-and-systems.

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	3	2	3	2	-	-	2	1	2	2	-	2	-
CO2	2	2	2	3	3	-	-	2	1	2	2	-	3	-
CO3	1	2	2	2	1	-	-	1	1	2	1	1	2	-
CO4	2	3	2	2	2	-	-	2	1	2	2	-	1	-
CO5	2	1	2	2	3	-	-	2	1	1	2	2	1	-
AVG	**1.8**	**2.2**	**2**	**2.4**	**2.2**	**-**	**-**	**1.8**	**1**	**1.8**	**1.8**	**1.5**	**1.8**	**-**

1 - low, 2 - medium, 3 - high, '-' - no correlation

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		L	T	P	C
23CRL41	**DATABASE MANAGEMENT SYSTEMS AND SECURITY LABORATORY** for B.E-CSE(Cyber Security)	0	0	3	1.5

COURSE OBJECTIVES:

- To learn and implement important commands in SQL.
- To learn the usage of nested and joint queries.
- To understand functions, procedures and procedural extensions of databases.
- To understand attacks on databases and to learn to defend against the attacks on databases.
- To learn to store and retrieve encrypted data in databases

LIST OF EXPERIMENTS

Note: The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines. The Examination shall not be restricted to the sample experiments listed here.

1. Create a database table, add constraints (primary key, unique, check, Not null), insert rows, update and delete rows using SQL DDL and DML commands.
2. Create set of tables, add foreign key constraints and incorporate referential integrity.
3. Query the database tables using different 'where' clause conditions and also implement aggregate functions.
4. Query the database tables and explore sub queries and simple join operations.
5. Query the database tables and explore natural, equi and outer joins.
6. Write user defined functions and stored procedures in SQL.
7. Execute complex transactions and realize DCL and TCL commands.
8. Write SQL Triggers for insert, delete, and update operations in database table.
9. Use SQLi to authenticate as administrator, to get unauthorized access over sensitive data, to inject malicious statements into form field.
10. Write programs that will defend against the SQLi attacks given in the previous exercise.
11. Write queries to insert encrypted data into the database and to retrieve the data Using decryption

TOTAL : 60 PERIODS

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COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : Create databases with different types of key constraints.

CO2 : Write simple and complex SQL queries using DML and DCL commands.

CO3 : Realize database design using 3NF and BCNF

CO4 : Use advanced features such as stored procedures and triggers.

CO5 : Secure databases and mitigate attacks on databases

E-RESOURCES:

https://onlinecourses.nptel.ac.in/noc22_cs91/preview

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	2	1	3	1	2	2	2	1	2	2	3	-
CO2	2	2	2	1	3	1	2	2	2	2	2	2	3	-
CO3	2	2	3	1	3	1	2	3	2	2	2	2	3	-
CO4	2	3	3	2	3	1	2	3	2	3	3	3	3	-
CO5	3	3	3	2	3	1	2	3	1	3	3	3	3	-
AVG	**2**	**2**	**3**	**1**	**3**	**1**	**2**	**3**	**2**	**2**	**2**	**2**	**3**	**-**

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23MDC41	SOFT SKILLS AND ANALYTICAL SKILLS - I	L	T	P	C
		1	0	0	0

COURSE OBJECTIVES:

- ☐ To make the students aware of critical thinking.
- ☐ To understand the significance of emotional intelligence in self-growth.
- ☐ Basic Knowledge about the Arithmetic Ability.
- ☐ To solve the problems in Business Computations.
- ☐ Understand the basics of Data Interpretation

UNIT-I **CRITICAL THINKING** 3

Active Listening –Observation –Curiosity –Introspection –Analytical Thinking –Open-mindedness – Creative Thinking.

UNIT-II **EMOTIONAL INTELLIGENCE** 3

Transactional analysis – Empathy – Sympathy - Conflict management.

UNIT-III **ARITHMETIC ABILITY** 3

Vedic Maths - Algebraic operations BODMAS, Fractions, Divisibility rules, LCM & GCD (HCF).

UNIT-IV **BUSINESS COMPUTATIONS** 3

Time & Distance, Partnership, simple & compound interest.

UNIT-V **DATA INTERPRETATION** 3

Line Graphs - Venn diagrams - Mixed Graphs.

TOTAL : 15PERIODS

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COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : Analyse and evaluate arguments and identify most common fallacies.

CO2 : Discover personal competence and techniques of building emotional intelligence.

CO3 : Enhance the Aptitude Round Clearing ability in interview process.

CO4 : Infer the concepts of Business Computations.

CO5 : Interrupt the data.

TEXT BOOKS:

1. Quantitative Aptitude for Competitive Examination by R.S. Agrawal, S.Chand Publications.
2. Soft Skills: an Integrated Approach to Maximise Personality, Gajendra S. Chauhan, Sangeeta Sharma, Wiley India.

REFERENCE BOOKS:

1. Analytical skills by Showick Thorpe, published by S Chand And Company Limited, Ramnagar, New Delhi-110055.
2. Quantitative Aptitude and Reasoning by R V Praveen, PHI publishers.
3. Quantitative Aptitude for Competitive Examination by AbhijitGuha, Tata Mc Graw Hill Publications.
4. Personality Development and Soft Skills, Barun K. Mitra, Oxford Press
5. Communication Skills for Engineers and Scientists , Sharma, Sangeeta & Binod Mishra., PHI India. (2 nd edition).

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23CRI51	CYBER FORENSICS for B.E-CSE(Cyber Security)	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES:

- To learn cyber crime and forensics
- To become familiar with forensics tools
- To learn to analyze and validate forensics data
- To understand cyber laws and the admissibility of evidence with case studies
- To learn the vulnerabilities in network infrastructure with ethical hacking

UNIT -I INTRODUCTION TO CYBER CRIME AND FORENSICS 9

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Role of ECD and ICT in Cybercrime - Classification of Cyber Crime. The Present and future of Cybercrime - Cyber Forensics -Steps in Forensic Investigation - Forensic Examination Process Types of CF techniques - Forensic duplication and investigation - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT- II EVIDENCE COLLECTION AND FORENSICS TOOLS 9

Processing Crime and Incident Scenes – Digital Evidence - Sources of Evidence -Working with File Systems. - Registry - Artifacts - Current Computer Forensics Tools: Software/ Hardware Tools - Forensic Suite - Acquisition and Seizure of Evidence from Computers and Mobile Devices Chain of Custody- Forensic Tools

UNIT-III ANALYSIS AND VALIDATION 9

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics - Analysis of Digital Evidence - Admissibility of Evidence - Cyber Laws in India - Case Studies

UNIT-IV ETHICAL HACKING 9

Introduction to Ethical Hacking - Footprinting and Reconnaissance - Scanning Networks Enumeration - System Hacking - Malware Threats – Sniffing – Email Tracking

UNIT-V ETHICAL HACKING IN WEB 9

Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.

TOTAL : 45 PERIODS

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PRACTICAL EXERCISES:

1. Study and Explore the following forensic tools:
   (a) FTK Imager
   (b) Autopsy
   (c)EnCase Forensic Imager
   (d) Last Activity View
   (e) USB Deview
2. Recover deleted files using FTK Imager
3. Acquire forensic image of hard disk using EnCase Forensics Imager and also perform integrity checking/validation
4. Restore the Evidence Image using EnCase Forensics Imager.
5. Study the following:
   (a) Collect Email Evidence in Victim PC.
   (b) Extract Browser Artifacts (Chrome History view for Google Chrome)
6. Use USB Deview to find the last connected USB to the system
7. Perform Live Forensics Case Investigation using Autopsy
8. Study Email Tracking and Email Tracing and write a report on them.

TOTAL: 30 PERIODS

TOTAL: 75 (45+30)PERIODS

COURSE OUTCOMES:

At the end of this course,the students will be able to:

CO1: Understand the basics of cyber crime and computer forensics

CO2: Apply a number of different computer forensic tools to a given scenario

CO3: Analyze and validate forensics data

CO4: Understand Admissibility of evidence in India with Cyber laws and Case Studies

CO5: Identify the vulnerabilities in a given network infrastructure

CO6: Implement real-world hacking techniques to test system security

TEXT BOOKS:

1. Bill Nelson, Amelia Phillips, Christopher Steuart, — Guide to Computer Forensics and Investigations||, Cengage Learning, India Sixth Edition, 2019.
2. CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, Version 11, 2021.
3. Dejey, S. Murugan - Cyber Forensics, Oxford University Press, India, 2018

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REFERENCES:

1. John R.Vacca, "Computer Forensics ", Cengage Learning, 2005

2. MarjieT.Britz, "Computer Forensics and Cyber Crime: An Introduction 3rd Edition, Prentice Hall, 2013.

3. AnkitFadia " Ethical Hacking, Second Edition, Macmillan India Ltd, 2006

4. Kenneth C.Brancik "Insider Computer Fraud|| Auerbach Publications Taylor &Francis Group–2008.

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	1	-	-	-	2	-	3	-
CO2	2	1	1	2	-	-	-	-	-	-	2	2	1	2
CO3	2	2	1	1	2	-	-	-	-	-	1	3	-	2
CO4	-	-	-	-	-	-	1	-	-	-	1	-	2	-
CO5	-	3	-	2	-	-	1	-	-	-	2	2	1	-
AVG	2	2	1	2	2	-	1	-	-	-	2	2	2	2

1-low, 2-medium, 3-high,'-'-nocorrelation

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BoS/CSE&IT

23CST51	CRYPTOGRAPHY AND CYBER SECURITY (for B.E –CSE , CS , AIML)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Learn to analyze the security of in-built cryptosystems.
- Know the fundamental mathematical concepts related to security.
- Develop cryptographic algorithms for information security.
- Comprehend the various types of data integrity and authentication schemes
- Understand cyber crimes and cyber security.

UNIT-I INTRODUCTION TO SECURITY 9

Computer Security Concepts– The OSI Security Architecture– Security Attacks – security Services and Mechanisms – A Model for Network Security – Classical encryption techniques: Substitution techniques, Transposition techniques, Steganography – Foundations of modern cryptography: Perfect security – Information Theory – Product Cryptosystem – Cryptanalysis.

UNIT-II SYMMETRIC CIPHERS 9

Number theory – Algebraic Structures – Modular Arithmetic - Euclid's algorithm – Congruence and matrices – Group, Rings, Fields, Finite Fields

SYMMETRIC KEY CIPHERS: SDES – Block Ciphers – DES, Strength of DES – Differential and linear cryptanalysis – Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Pseudorandom Number Generators – RC4 – Key distribution.

UNIT-III ASYMMETRIC CRYPTOGRAPHY 9

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes – Primality Testing – Factorization – Euler's totient function, Fermat's and Euler's Theorem – Chinese Remainder Theorem – Exponentiation and logarithm

ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange -- Elliptic curve arithmetic – Elliptic curve cryptography.

UNIT-IV INTEGRITY AND AUTHENTICATION ALGORITHMS 9

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function: HMAC, CMAC – SHA – Digital signature and authentication protocols – DSS – Schnorr Digital Signature Scheme –ElGamal cryptosystem –Entity Authentication: Biometrics, Passwords, Challenge Response protocols – Authentication applications – Kerberos

MUTUAL TRUST: Key management and distribution – Symmetric key distribution using symmetric and asymmetric encryption – Distribution of public keys – X.509 Certificates.

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UNIT-V **CYBER CRIMES AND CYBER SECURITY** **9**

Cyber Crime and Information Security – classifications of Cyber Crimes – Tools andMethods – Password Cracking, Keyloggers, Spywares, SQL Injection – Network Access Control – Cloud Security – Web Security – Wireless Security

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the fundamentals of networks security, security architecture, threats and vulnerabilities

CO2: Apply the different cryptographic operations of symmetric cryptographic algorithms

CO3: Apply the different cryptographic operations of public key cryptography

CO4: Apply the various Authentication schemes to simulate different applications.

CO5: Understand various cyber crimes and cyber security.

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security - Principles and Practice", Seventh Edition, Pearson Education, 2017.
2. Nina Godbole,Sunit Belapure,"Cyber Security: Understanding Cyber crimes, Computer Forensics and Legal Perspectives", First Edition, Wiley India, 2011.

REFERENCE BOOKS:

1. BehrouzA. Ferouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", 3rd Edition, Tata Mc Graw Hill, 2015.
2. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies," Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.

E-RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc22_cs90/preview

CO's – PO's & PSO's MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	2	2	-	-	1	-	-	1	2	3	3
CO2	3	3	3	3	3	-	-	2	-	-	1	3	3	3
CO3	3	3	3	3	3	-	-	2	-	-	1	3	3	3
CO4	3	3	3	3	3	-	-	2	-	-	1	3	3	3
CO5	3	2	3	2	3	-	-	3	-	-	2	**3**	2	3
AVG	**3**	**2.6**	**2.6**	**2.6**	**2.8**	**-**	**-**	**2**	**-**	**-**	**1.2**	**2.8**	**2.8**	**3**

1 - low, 2 - medium, 3 - high, '-' - no correlation

Chairman
BoS/CSE&IT

23CST52	DISTRIBUTED COMPUTING (for B.E/B.Tech-CSE,IT , AIDS , CS, AIML)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To introduce the computation and communication models of distributed systems
- To illustrate the issues of synchronization and collection of information in distributed systems
- To describe distributed mutual exclusion and distributed deadlock detection techniques
- To elucidate agreement protocols and fault tolerance mechanisms in distributed systems
- To explain the cloud computing models and the underlying concepts

UNIT-I **INTRODUCTION** **8**

Introduction: Definition-Relation to Computer System Components–Motivation–Message-Passing ystems versus Shared Memory Systems–Primitives for Distributed Communication–Synchronous ersus Asynchronous Executions – Design Issues and Challenges; A Model of Distributed omputations: A Distributed Program – A Model of Distributed Executions – Models of ommunication Networks–Global State of a Distributed System

UNIT II **LOGICAL TIME AND GLOBAL STATE** **10**

Logical Time: Physical Clock Synchronization: NTP A Framework for a System of Logical Clocks Scalar Time – Vector Time; Message Ordering and Group Communication: Message Ordering Paradigms – Asynchronous Execution with Synchronous Communication – Synchronous Program Order on Asynchronous System – Group Communication – Causal Order – Total Order; Global State and Snapshot Recording Algorithms: Introduction–System Model and Definitions–Snapshot Algorithms for FIFO Channels.

UNIT III **DISTRIBUTED MUTEX AND DEADLOCK** **10**

Distributed Mutual exclusion Algorithms: Introduction–Preliminaries–Lamport's algorithm–Ricart - Agrawala's Algorithm––Token-Based Algorithms–Suzuki-Kasami's Broadcast Algorithm; Deadlock Detection in Distributed Systems: Introduction – System Model – Preliminaries – Models of Deadlocks– Chandy-Misra-Haas Algorithm for the AND model and OR Model.

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UNIT IV **CONSENSUS AND RECOVERY** **10**

Consensus and Agreement Algorithms: Problem Definition–Overview of Results–Agreement in a Failure-Free System(Synchronous and Asynchronous) – Agreement in Synchronous Systems with Failures; Check pointing and Rollback Recovery: Introduction–Background and Definitions–Issues in Failure Recovery–Checkpoint-based Recovery–Coordinated Check pointing Algorithm-Algorithm for Asynchronous Check pointing and Recovery

UNIT V **CLOUD COMPUTING** **7**

Definition of Cloud Computing – Characteristics of Cloud – Cloud Deployment Models – Cloud Service Models – Driving Factors and Challenges of Cloud – Virtualization – Load Balancing – Scalability and Elasticity – Replication – Monitoring – Cloud Services and Platforms: Compute Services – Storage Services– Application Services

TOTAL:45 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : Explain the foundations of distributed systems.

CO2 : Solve synchronization and state consistency problems.

CO3 : Use resource sharing techniques in distributed systems.

CO4 : Apply working model of consensus and reliability of distributed systems.

CO5 : Explain the fundamentals of cloud computing.

TEXT BOOKS:

1. Kshem kalyani AjayD ,Mukesh Singhal, "Distributed Computing: Principles, Algorithms and Systems",Cambridge Press,2011.
2. Mukesh Singhal ,Niranjan G Shivaratri,"Advanced Concepts in Operating systems ",Mc-Graw Hill Publishers,1994.

REFERENCE BOOKS:

1. George Coulouris,Jean Dollimore,Time Kindberg, "Distributed Systems Concepts and Design",Fifth Edition,Pearson Education,2012.
2. Pradeep L Sinha,"Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.
3. Tanenbaum AS ,VanSteenM, "Distributed Systems: Principles and Paradigms", Pearson Education, 2007.

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E-RESOURCES:

1. https://nptel.ac.in/courses/106106107

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	3	3	1	-	-	2	1	3	3	2	1	1
CO2	1	3	2	1	2	-	-	2	2	2	2	1	3	2
CO3	2	2	1	3	3	-	-	3	2	1	1	1	2	1
CO4	1	2	2	3	1	-	-	3	3	2	1	3	1	1
CO5	3	3	1	2	3	-	-	3	3	3	1	3	2	3
AVG	**1.8**	**2.4**	**1.8**	**2.4**	**2**	**-**	**-**	**2.6**	**2.2**	**2.2**	**1.6**	**2**	**1.8**	**1.6**

1 - low, 2 - medium, 3 - high, '-' - no correlation

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BoS/CSE& IT

23CSI51	COMPUTER NETWORKS (for BE/B.Tech. –CSE , IT , AIDS, CS)	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES:

- To understand the concept of layering in networks.
- To know the functions of protocols of each layer of TCP/IP protocol suite.
- To visualize the end-to-end flow of information.
- To learn the functions of network layer and the various routing protocols
- To familiarize the functions and protocols of the Transport layer

UNIT-I INTRODUCTION AND APPLICATION LAYER 10

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

UNIT-II TRANSPORT LAYER 9

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

UNIT-III NETWORK LAYER 7

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

UNIT-IV ROUTING 7

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

UNIT-V DATA LINK AND PHYSICAL LAYERS 12

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.

TOTAL:45 PERIODS

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PRACTICAL EXERCISES:

1. Learn to use commands like tcp dump, netstat, if config, ns lookup and trace route. Capture ping and trace route PDUs using a network protocol analyzer and examine.
2. Write a HTTP web client program to download a web page using TCP sockets.
3. Applications using TCP sockets like: a) Echo client and echo server b) Chat
4. Simulation of DNS using UDP sockets.
5. Use a tool like Wireshark to capture packets and examine the packets
6. Write a code simulating ARP /RARP protocols.
7. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
8. Study of TCP/UDP performance using Simulation tool.
9. Simulation of Distance Vector/ Link State Routing algorithm.
10. Simulation of an error correction code (like CRC)

TOTAL:30 PERIODS

TOTAL: 75(45+30) PERIODS

COURSE OUTCOMES:

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

CO1: Explain the basic layers and its functions in computer networks.

CO2: Understand the basics of how data flows from one node to another.

CO3: Analyze routing algorithms.

CO4: Describe protocols for various functions in the network.

CO5: 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, Eighth Edition, Pearson Education, 2021.
2. Behrouz A. Forouzan, Data Communications and Networking with TCP/IP Protocol Suite, Sixth Edition TMH, 2022.

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REFERENCE BOOKS:

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education,2013
3. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill, 2012.

E-RESOURCES:

1.https://online courses.nptel.ac.in/noc22_cs19/preview

2.https://www.udemy.com/topic/computer-network/

CO's – PO's & PSO's MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	2	-	-		-	-	-	-	-	-	3	-	-
CO2	-	1	-	-	2	-	-	-	-	-	2	-	2	-
CO3	-	2	-	-	3	-	-	-	-	-	-	-	3	-
CO4	-	-	-	1	2	-	-	-	3	-	-	-	-	-
CO5	-	3	2	-	-	-	-	-	-	-	-	-	-	3
AVG	-	**2**	**2**	**1**	**2.3**	-	-	-	**3**	-	**2**	**3**	**2.5**	**3**

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23CRL51	CRYPTOGRAPHY AND CYBER SECURITY LABORATORY For B.E-CSE(Cyber Security)	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES:

- To understand the fundamental concepts of cryptography, including classical and modern encryption techniques.
- To implement symmetric and asymmetric encryption algorithms for secure data communication.
- To analyze key exchange mechanisms and their role in establishing secure communication channels.
- To understand and apply hashing algorithms for data integrity and authentication.
- To implement digital signature mechanisms to ensure data authenticity, integrity, and non-repudiation.

LIST OF EXPERIMENTS

1. Write a program to implement the following cipher techniques to perform encryption and decryption
   i. Caesar Cipher
   ii. Playfair Cipher
   iii. Hill Cipher
2. Write a program to implement the following transposition techniques
   i. Rail fence technique –Row major transformation
   ii. Rail fence technique - Column major transformation
3. Write a program to implement DES algorithm
4. Write a program to implement AES algorithm
5. Write a program to implement RSA Encryption algorithm
6. Write a program to implement the Diffie-Hellman Key Exchange mechanism. Consider one of the parties as Alice and the other party as bob.
7. Write a program to calculate the message digest of a text using the SHA-1 algorithm.
8. Write a program to calculate the message digest of a text using the MD-5 algorithm.
9. Write a program to implement digital signature standard.

TOTAL : 45 PERIODS

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COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : Implement classical cryptographic techniques such as Caesar, Playfair, and Hill ciphers for encryption and decryption

CO2 : Design and implement transposition techniques like Rail Fence cipher using row-major and column-major transformations.

CO3 : Implement symmetric and asymmetric cryptographic algorithms such as DES, AES, and RSA for secure communication.

CO4 : Apply key exchange and hashing algorithms including Diffie-Hellman, SHA-1, and MD5 for secure key management and data integrity.

CO5: Implement digital signature standards to provide authentication, integrity, and non-repudiation in information systems.

E-RESOURCES

https://nptel.ac.in/courses/128108019

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	-	-	3	-	-	1	3	3	-
CO2	3	3	3	3	3	-	-	3	-	-	1	3	3	-
CO3	3	3	3	3	3	-	-	3	-	-	1	3	3	-
CO4	3	3	3	3	3	-	-	3	-	-	1	3	3	-
CO5	3	3	3	3	3	-	-	3	-	-	1	3	3	-
AVG	**3**	**3**	**3**	**3**	**3**	-	-	**3**	-	-	**1**	**3**	**3**	-

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23MDC54	DISASTER RISK REDUCTION AND MANAGEMENT	L	T	P	C
		3	0	0	0

COURSE OBJECTIVES:

- To impart knowledge on concepts related to disaster, disaster risk reduction, disaster management
- To acquaint with the skills for planning and organizing disaster response
- To develop disaster response skills by adopting relevant tools and technology
- To Enhance awareness of institutional processes for Disaster response in the country
- To Develop rudimentary ability to respond to their surroundings with potential Disaster response in areas where they live, with due sensitivity

UNIT-I HAZRADS, VULNERABILITY AND DISASTER RISKS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Types of Disasters: Natural, Human induced, Climate change induced –Earthquake, Landslide, Flood, Drought, Fire etc – Technological disasters- Structural collapse, Industrial accidents, oil spills -Causes, Impacts including social, Economic, political, environmental, health, psychosocial, etc.- Disaster vulnerability profile of India and Tamil Nadu - Global trends in disasters: urban disasters, pandemics, Complex emergencies, - Inter relations between Disasters and Sustainable development Goals

UNIT-II DISASTER RISK REDUCTION (DRR) 9

Sendai Framework for Disaster Risk Reduction, Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community Based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions / Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders- Early Warning System – Advisories from Appropriate Agencies.- Relevance of indigenous Knowledge, appropriate technology and Local resources.

UNIT-III DISASTER MANAGEMENT 9

Components of Disaster Management – Preparedness of rescue and relief, mitigation, rehabilitation and reconstruction- Disaster Risk Management and post disaster management – Compensation and Insurance- Disaster Management Act (2005) and Policy - Other related policies, plans, programmers and legislation - Institutional Processes and Framework at State and Central Level- (NDMA –SDMA-DDMA-NRDF- Civic Volunteers)

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UNIT-IV **TOOLS AND TECHNOLOGY FOR DISASTER MANAGEMENT** **9**

Early warning systems -Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment. - Elements of Climate Resilient Development –Standard operation Procedure for disaster response – Financial planning for disaster Management

UNIT-V **DISASTER MANAGEMENT: CASE STUDIES** **9**

Discussion on selected case studies to analyse the potential impacts and actions in the contest of disasters-Landslide Hazard Zonation: Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.- Field work-Mock drill -

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : To impart knowledge on the concepts of Disaster, Vulnerability and Disaster Risk reduction (DRR)

CO2 : To enhance understanding on Hazards, Vulnerability and Disaster Risk Assessment prevention and risk reduction

CO3 : To develop disaster response skills by adopting relevant tools and technology

CO4 : Enhance awareness of institutional processes for Disaster response in the country and

CO5 : Develop rudimentary ability to respond to their surroundings with potential Disaster response in areas where they live, with due sensitivity

TEXT BOOKS:

1. Taimpo (2016), Disaster Management and Preparedness, CRC Publications
2. Singh R (2017), Disaster Management Guidelines for earthquakes, Landslides, Avalanches and tsunami, Horizon Press Publications
3. Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
4. Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]

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REFERENCE BOOKS:

1. Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005.
2. Government of India, National Disaster Management Policy, 2009.
3. Shaw R (2016), Community based Disaster risk reduction, Oxford University Press

E-RESOURCES:

1. https://archive.nptel.ac.in/courses/124/107/124107010/
2. https://nptel.ac.in/courses/124107010

CO's – PO's & PSO's MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	3	3	2	3	-	1	2	-	-	2	-	2	-	1
CO2	3	3	3	3	-	1	1	-	-	2	-	2		1
CO3	3	3	3	3	-	1	2	-	-	-	-	2		1
CO4	3	3	2	3	-	1	1	-	-	2	-	2		1
CO5	3	3	2	3	-	1	2	-	-	2	-	3		1

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23CRI61	NETWORK SECURITY	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES:

- To understand the basic concepts of security
- To understand the concept of authentication protocols and digital signatures.
- To learn various methods and protocols to understand the cryptography.
- To learn various network security attacks.
- To understand the IP and Web security.

UNIT -I **FUNDAMENDALS OF NETWORKING SECURITY** **9**

Overview of networking security- Security Services -Confidentiality, Authentication, Integrity, Non-repudiation, access Control - Availability and Mechanisms- Security Attacks -Interruption, Interception ,Modification and Fabrication.

UNIT- II **AUTHENTICATION AND SECURITY** **9**

Authentication overview - Authentication protocols - Authentication and key establishment - key exchange - mediated key exchange - User Authentication –password based authentication - password security - Certificate Authority and key management - digital signatures - digital Certificates.

UNIT-III **PUBLIC-KEY CRYPTOGRAPHY AND MESSAGE AUTHENTICATION** **9**

Basics of cryptography -cryptographic hash functions - symmetric and public-key encryption - public key cryptography principles & algorithms - cipher block modes of operation - Secure Hash Functions – HMAC

UNIT-IV **SECURITY ATTACKS** **9**

Buffer overflow attacks & format string vulnerabilities - Denial-of-Service Attacks -Hijacking attacks : exploits and defenses - Internet worms – viruses – spyware –phishing – botnets - TCP session hijacking - ARP attacks - route table modification - UDP hijacking - man-in-the-middle attacks.

UNIT-V **IP SECURITY AND WEB SECURITY** **9**

Network defense tools: Firewalls,VPNs, Intrusion Detection, and filters - Email privacy: Pretty Good Privacy (PGP) and S/MIME - Network security protocols in practice- Introduction to Wireshark – SSL - IPsec, and IKE -DNS security- Secure Socket Layer (SSL) and Transport Layer

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Security (TLS) - Secure Electronic Transaction (SET)

TOTAL : 45 PERIODS

PRACTICAL EXERCISES:

1. Using Wireshark explore the different layer protocol headers.
2. Demonstrate two different Certificates producing the same MD5 hash
3. Computing MACs, HASH and HMAC for messages
4. Implement and demonstrate Buffer overflow attack
5. Implement and demonstrate Denial of service attacks (DoS) and DDoS
6. Implement the ARP attack and MITM
7. Implement the Botnet attack detection using publically available dataset
8. Explore and install Snort intrusion detection tool
9. Implement Firewall rules using snort
10. Generate the network attack and Detect the attack using Snort

TOTAL: 30 PERIODS

TOTAL: 75 (45+30) PERIODS

COURSE OUTCOMES:

At the end of the course the students will be able to

CO1 : Describe computer and network security fundamental concepts and principles.

CO2 : Acquire the knowledge of various authentication protocols, key exchange mechanism, and digital certificates.

CO3 : To get better knowledge on fundamental concepts of cryptography, encryption and hashing techniques.

CO4 : Identify and assess different types of threats and attacks such as social engineering, rootkit, and botnets, etc.

CO5 : Acquire Demonstrate the ability to select among available network security technology and protocols such as IDS, firewalls, SSL , TLS, etc.

TEXT BOOKS:

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.

REFERENCES:

1. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W. Manzuik and Ryan Permeh, Wiley Dreamtech.

2. Cryptography and network Security, Third edition, Stallings, PHI/Pearson.

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3. A look back at Security Problems in the TCP/IP Protocol Suite, S. Bellovin, ACSAC.

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	-	-	1	-	-	1	-	3	-
CO2	3	3	3	3	3	-	-	2	-	-	1	2	1	2
CO3	3	3	3	3	3	-	-	2	-	-	1	3	-	2
CO4	3	3	2	3	2	-	-	3	-	-	3	-	2	-
CO5	3	3	3	3	3	-	-	3	-	-	2	2	1	-
AVG	3	2.8	2.4	3	2.4	-	-	2.2	-	-	1.6	2	2	2

1-low, 2-medium, 3-high,'-'-nocorrelation

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23MEO14	FIRE SAFETY ENGINEERING	L	T	P	C
		3	0	0	3

Course Objectives:

The main learning objective of this course is to prepare the students to:

- To enable the students to acquire knowledge of Fire and Safety Studies
- To learn about the effect of fire on materials used for construction, the method of test for non-combustibility & fire resistance
- To learn about fire area, fire stopped areas and different types of fire-resistant doors
- To learn about the method of fire protection of structural members and their repair due to fire damage.
- To develop safety professionals for both technical and management through systematic and quality-based study programmes

UNIT-I INHERENT SAFETY CONCEPTS 9

Compartment fire-factors controlling fire severity, ventilation controlled and fuel controlled fires; Spread of fire in rooms, within building and between buildings. Effect of temperature on the properties of structural materials, Behavior of non-structural materials

UNIT-II PLANT LOCATIONS 9

Compartment temperature-time response at pre-flashover and post flashover periods; Equivalence of fire severity of compartment fire and furnace fire; Fire resistance test on structural elements standard heating condition, Indian standard test method

UNIT-III WORKING CONDITIONS 9

Fire separation between building- principles of calculation of safe distance. Design principles of fire resistant walls and ceilings; Fire resistant screens- solid screens and water curtains; Local barriers; Fire stopped areas-in roof, in fire areas and in connecting structures

UNIT-IV FIRE SEVERITY AND REPAIR TECHNIQUES 9

Fabricated fire proof boards-calcium silicate, Gypsum, Vermiculite, and Perlite boards. Reparability of fire damaged structures- Assessment of damage to concrete, steel, masonry and timber structures, Repair techniques- repair methods to reinforced concrete Columns, beams and slabs

UNIT-V WORKING AT HEIGHTS 9

Safe Access - Requirement for Safe Work Platforms- Stairways - Gangways and Ramps-Fall Prevention & Fall Protection - Safety Belts - Safety nets - Fall Arrestors- Working on Fragile Roofs - Work Permit Systems-Accident Case Studies

TOTAL : 45 PERIODS

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COURSE OUTCOMES:

At the end of the course the students will be able to

CO1: Understand the effect of fire on materials used for construction

CO2: Understand the method of test for non-combustibility and fire resistance; and will be able to select different structural elements and their dimensions for a particular fire resistance rating of a building.

CO3: To understand the design concept of fire walls, fire screens, local barriers and fire doors and able to select them appropriately to prevent fire spread.

CO4: To decide the method of fire protection to RCC, steel, and wooden structural elements and their repair methods if damaged due to fire.

CO5: Describe the safety techniques and improve the analytical and intelligence to take the right decision at right time.

TEXT BOOKS:

1. Roytman, M. Y,||Principles of fire safety standards for building construction||. Amerind Publishing Co. Pvt. Ltd., New Delhi,1975
2. John A. Purkiss,||Fire safety engineering design of structures|| (2nd edn.), Butterworth Heinemann, Oxford, UK,2009.

REFERENCE BOOKS:

1. Smith, E.E. and Harmathy, T.Z. (Editors),||Design of buildings for fire safety||. ASTM Special Publication 685, American Society for Testing and Materials, Boston, U.S.A,1979.
2. Butcher, E. G. and Parnell, A. C, ||Designing of fire safety||. JohnWiley and Sons Ltd., New York, U.S.A.1983.
3. Jain, V.K,||Fire safety in buildings|| (2nd edn.). New Age International(P) Ltd., New Delhi,2010. 4. Hazop&Hazan,||Identifying and Assessing Process Industry Hazards||, Fourth Edition ,1999
4. Frank R. Spellman, Nancy E. Whiting,||The Handbook of Safety Engineering: Principles and Applications||, 2009

E-RESOURCES:

1. https://www.youtube.com/watch?v=izGdVqh0icM

2. https://www.youtube.com/watch?v=ka8oOirP7B8

CO's – PO's & PSO's MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	-	1	-	-	1	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	1	-	2	-	-	-	-	-	1	-	-	-	-	-
CO4	-	-	-	-	-	1	-	-	-	-	-	-	-	-
CO5	2	-	1	-	-	1	1	-	1	-	1	-	-	-
Avg	1.3	-	1.75	-	-	1	1		1	-	1	-	-	-

1 - low, 2 - medium, 3 - high, '-' - no correlation

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23UHV71	UNIVERSAL HUMAN VALUES-2 (Common to all branches)	L	T	P	C
		2	1	0	3

Course Objectives:

- Transform the students for the essential complementarily between 'VALUES' and 'SKILLS'.
- Develop students towards life and profession as well as towards happiness and prosperity.
- Exploring the difference of Needs of Self and Body.
- To highlight ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.
- Exploring Humanistic Models in Education.

UNIT-I **Introduction to Value Education** **6+3**

Lectures - Understanding Value Education - Self-exploration as the Process for Value Education - Continuous Happiness and Prosperity – the Basic Human Aspirations - Right Understanding, Relationship and Physical Facility - Happiness and Prosperity – Current Scenario - Method to Fulfill the Basic Human Aspirations

Tutorials *[Practice Session] - Sharing about Oneself - Exploring Human Consciousness - Exploring Natural Acceptance*

UNIT-II **Harmony in the Human Being** **6+3**

Lectures - Understanding Human being as the Co-existence of the Self and the Body - Distinguishing between the Needs of the Self and the Body – The Body as an Instrument of the Self - Understanding Harmony in the Self - Harmony of the Self with the Body - Programme to ensure self-regulation and Health

Tutorials *[Practice Session] - Exploring the difference of Needs of Self and Body - Exploring Sources of Imagination in the Self - Exploring Harmony of Self with the Body*

UNIT-III **Harmony in the Family and Society** **6+3**

Lectures - Harmony in the Family – the Basic Unit of Human Interaction - Values in Human-to-Human Relationship – 'Trust' – the Foundational Value in Relationship - 'Respect' – as the Right Evaluation - Understanding Harmony in the Society - Vision for the Universal Human Order

Tutorials *[Practice Session] - Exploring the Feeling of Trust - Exploring the Feeling of Respect - Exploring Systems to fulfil Human Goal*

UNIT-IV **Harmony in the Nature/Existence** **6+3**

Lectures - Understanding Harmony in the Nature - Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature – Realizing Existence as Co-existence at All Levels - The Holistic Perception of Harmony in Existence

Tutorials *[Practice Session] - Exploring the Four Orders of Nature - Exploring Co-existence in Existence*

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UNIT-V **Implications of the Holistic Understanding** **6+3**

Lectures - Natural Acceptance of Human Values - Definitiveness of (Ethical) Human Conduct – A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order - Competence in Professional Ethics - Holistic Technologies, Production Systems and Management Models-Typical Case Studies - Strategies for Transition towards Value-based Life and Profession

Tutorials *[Practice Session] - Exploring Ethical Human Conduct - Exploring Humanistic Models in Education - Exploring Steps of Transition towards Universal Human Order*

Total Hours **45**

COURSE OUTCOME

CO's	OUTCOME
CO1	• Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
CO2	• Students would become more responsible in life, and in handling problems with sustainable solutions.
CO3	• Students become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
CO4	• Students would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction .
CO5	• Students would have better critical ability.

Text Books:

- A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
- Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978- 93-87034-53-2

Reference Books:

- Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999
- Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004
- The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

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