



Sri
SAI RAM
ENGINEERING COLLEGE
An Autonomous Institution
West Tambaran, Chennai - 44
www.sairam.edu.in

Approved by AICTE, New Delhi
Affiliated to Anna University



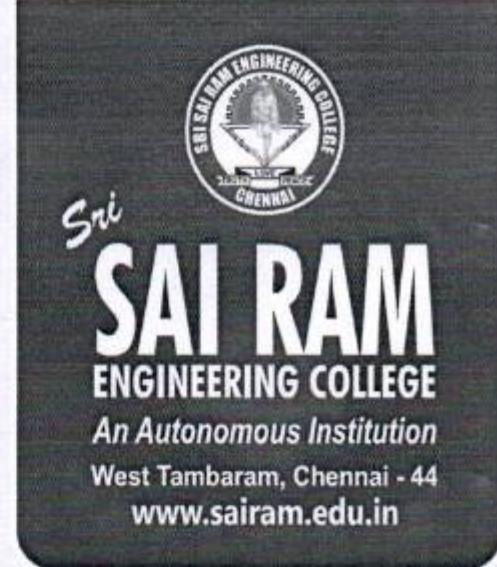
**B.E. COMPUTER SCIENCE & ENGINEERING
INTERNET OF THINGS (IoT)**

REGULATIONS 2024

Academic Year 2024-25 onwards

**AUTONOMOUS
CURRICULUM AND**

**SYLLABUS
I - IV
SEMESTERS**



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IOT

**B.E. COMPUTER SCIENCE & ENGINEERING
INTERNET OF THINGS (IoT)**

REGULATIONS 2024

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**AUTONOMOUS
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SEMESTERS**

SRI SAIRAM ENGINEERING COLLEGE



VISION

To emerge as a "Centre of excellence" offering Technical Education and Research opportunities of very high standards to students, develop the total personality of the individual and instil high levels of discipline and strive to set global standards, making our students technologically superior and ethically stronger, who in turn shall contribute to the advancement of society and humankind.



MISSION

We dedicate and commit ourselves to achieve, sustain and foster unmatched excellence in Technical Education. To this end, we will pursue continuous development of infra-structure and enhance state-of-the-art equipment to provide our students a technologically up-to date and intellectually inspiring environment of learning, research, creativity, innovation and professional activity and inculcate in them ethical and moral values.



Educational Organization Management System (EOMS) Policy

We at Sri Sai Ram Engineering College are committed to empower our students not only to excel academically but also imbibe essential values, enabling them to become exemplary global citizens. We build a better nation by fostering excellence and innovative practices in Engineering, Technology and Management Education. We are dedicated to consistently enhancing our systems, infrastructure and services to meet the needs and expectations of all our stakeholders for sustainable growth

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING INTERNET OF THINGS (IoT)



VISION

To develop technical professionals into entrepreneurs and IoT experts and to provide students with the skill sets and subject knowledge that they need to succeed in the Internet of Things world.



MISSION

Computer Science and Engineering (Internet of Things), Sri Sai Ram Engineering College is committed to:

- M1:** To provide good infrastructure and teaching learning ambience
- M2:** Connect geographically dispersed devices with a variety of capabilities.
- M3:** Utilize Computers and peripherals to build IoT hardware.
- M4:** Facilitate Industry Academia interface to update the recent trends in IoT.

AUTONOMOUS CURRICULA AND SYLLABI
Regulations 2024
SEMESTER I

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			CONTACT PERIODS	CREDITS
			L	T	P		
THEORY							
1	24BSMA101	Matrices and Calculus	3	1	0	4	4
2	24HSEN101	Communicative English	3	0	0	3	3
3	24BSPH101	Engineering Physics	3	0	0	3	3
4	24BSCY101	Engineering Chemistry	3	0	0	3	3
5	24ESCS101	Problem Solving and Programming in C	3	0	0	3	3
6	24ESGE101	Engineering Graphics	1	2	0	3	3
7	24HSTA101	Heritage of Tamils	1	0	0	1	1
PRACTICALS							
1	24BSPL101	Physics and Chemistry Laboratory	0	0	4	4	2
2	24ESPL101	Programming in C Laboratory	0	0	2	2	1
VALUE ADDITIONS - I							
1	24ESID101	Idea Engineering Lab - I	1	0	1	2	1
2	24ENTP101	Functional Life Skills	0	0	2	2	1
ONLINE SUPPLEMENTARY							
		As recommended by BOS					
			Total			30	25

SEMESTER II

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			CONTACT PERIODS	CREDITS
			L	T	P		
THEORY							
1	24BSMA201	Discrete Structures	3	1	0	4	4
2	24HSEN201	Professional English	2	0	0	2	2
3	24BSPH203	Physics for Information Science	3	0	0	3	3
4	24BSCY201	Chemistry for Environment and Sustainability	3	0	0	3	3
5	24HSTA201	Tamils and Technology	1	0	0	1	1
6	24HSNC201	NCC Course Level 1*	2	0	0	2	0
PRACTICALS							
1	24AIPT201	Python for Data Science Laboratory with Theory	1	0	4	5	3
2	24ESGE102	Engineering Practices Laboratory	0	0	4	4	2
VALUE ADDITIONS - II							
1	24ESID201	Idea Engineering Lab - II	0	0	2	2	1
2	24ENTP201	Digital Dynamics	1	0	1	2	0
ONLINE SUPPLEMENTARY							
1	24ESMC201	MS Office (Mandatory - NC)	0	0	0	0	0
		Approved by	Total			28	19

Academic Council Meeting i
No. 05 Dated: 17/04/25

Santhi
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 Board of Studies
 Computer Science and Engineering
 (Internet of Things)

AUTONOMOUS CURRICULA AND SYLLABI
SEMESTER III Regulations 2024

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			CONTACT PERIODS	CREDITS
			L	T	P		
THEORY							
1	24BSMA301	Statistics and Linear Algebra	3	1	0	4	4
2	24ITPC301	Data Structures and Algorithms	3	0	0	4	3
3	24ESCI301	Basic Electronics and Communication Engineering	3	0	0	3	3
4	24CIPC301	Introduction to Internet of Things	3	0	0	3	3
5	24CIPT301	Digital Design and Computer Organisation System Laboratory with Theory	1	0	4	5	3
5	24HSMC301	Universal Human Values - II Understanding Harmony	2	1	0	3	3
6	24HSNC301	NCC course Level 2*	3	0	0	3*	0
PRACTICALS							
7	24ITPL301	Data Structures and Algorithms Laboratory	0	0	4	4	2
8	24CIPL301	IoT and Embedded Systems laboratory	0	0	4	4	2
VALUE ADDITIONS - III							
9	24CITP301	Aptitude Skills - I	0	0	2	2	1
10	24CIID301	Innovative design Lab - I	0	0	2	2	1
ONLINE SUPPLEMENTARY							
11	24ESMC301	Joy of Computing using Python (Mandatory - NC)	0	2	0	2	0
Total						34	25

SEMESTER IV

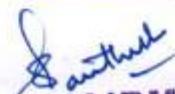
S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			CONTACT PERIODS	CREDITS
			L	T	P		
THEORY							
1	24BSMA402	Probability and Queuing Theory	3	1	0	5	4
2	24SCPT401	Operating system in kali linux lab with theory	1	0	4	5	3
3	24CSPC401	Theoretical Computer Science	3	0	0	3	3
4	24ITPW301	Database Management System with Laboratory	3	0	2	5	4
5	24XXOEXXX	Open Elective - I#	3	0	0	3	3
6	24HSNC401	NCC course Level 3*	3	0	0	3*	0
PRACTICALS							
7	24CSPT401	Object Oriented Programming Laboratory with theory	1	0	4	5	3
8	24CIPT401	Communication and Networking Technologies laboratory with theory	1	0	4	5	3
VALUE ADDITIONS - IV							
9	24CITP401	Aptitude Skills - II	0	0	2	2	0
10	24CIID401	Innovative Design Lab - II	0	0	2	2	1
ONLINE SUPPLEMENTARY							
		As recommended by BoS					
Total						34	24

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*only for NCC cadets to be conducted beyond working hours

Academic Council Meeting ii

No. 05 Dated: 17/04/25


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AUTONOMOUS CURRICULA AND SYLLABI

Regulations 2024

SEMESTER V

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			CONTACT PERIODS	CREDITS
			L	T	P		
THEORY							
1	24ITPW501	Web Technology with Laboratory	3	0	2	5	4
2	24XXEL5XX	Professional Elective - I	3	0	0	3	3
3	24XXEL5YY	Professional Elective - II	3	0	0	3	3
4	24HSMG501	Principles of Engineering Management	3	0	0	3	3
5	24XXOE9XXX	Open Elective - II #	3	0	0	3	3
6	24MGMC501	Constitution of India	2	0	0	2	0
PRACTICALS							
7	24CIPT501	Architecture and Programming in IoT Laboratory with theory	1	0	4	5	3
VALUE ADDITIONS - V							
8	24CITP501	Skill Enhancement	0	0	2	2	1
9	24CIID501	Prototype development Laboratory - I	0	0	2	2	1
ONLINE SUPPLEMENTARY							
		As recommended by BOS	Total			28	21

*only for NCC cadets to be conducted beyond working hours

SEMESTER VI

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			CONTACT PERIODS	CREDITS
			L	T	P		
THEORY							
1	24AMPW403	Machine learning Techniques with laboratory	3	0	2	5	4
2	24XXEL6XX	Professional Elective - III	3	0	0	3	3
3	24XXEL6YY	Professional Elective - IV	3	0	0	3	3
4	24XXEL6ZZ	Professional Elective - V	3	0	0	3	3
5	24XXOE9XX	Open Elective - III	3	0	0	3	3
PRACTICALS							
6	24CIPT601	Artificial Intelligence for IoT Laboratory with theory	1	0	4	5	3
7	24CIPT602	Sensors and Actuators Laboratory with theory	1	0	4	5	3
VALUE ADDITIONS - VI							
8	24CITP601	Technical Skill	0	0	2	2	0
9	24CIID601	Prototype development Lab - II	0	0	2	2	1
ONLINE SUPPLEMENTARY							
		As recommended by BOS	Total			31	23

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AUTONOMOUS CURRICULA AND SYLLABI

Regulations 2024

SEMESTER VII

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			CONTACT PERIODS	CREDITS
			L	T	P		
THEORY							
1	24CIPW701	Data Management in IoT with laboratory	3	0	2	5	4
2	24XXEL7YY	Professional Elective - VI	3	0	0	3	3
4	24XXOEXXX	Open Elective - IV	3	0	0	3	3
5	24MGEL703	Creative Innovation and Entrepreneurship	2	0	0	2	2
PRACTICALS							
7	24CIPJ701	Project work - Phase- I	0	0	8	8	4
8	24CIPL701	IoT Cloud Computing Laboratory	0	0	4	4	2
VALUE ADDITIONS - VII							
9	24CITP701	Company Specific Skills	0	0	2	2	1
ONLINE SUPPLEMENTARY							
		As recommended by BOS					
Total						27	19

SEMESTER VIII

S. NO	COURSE CODE	COURSE TITLE	WEEK HOURS			CONTACT PERIODS	CREDITS
			L	T	P		
THEORY							
1	24CIEL8xx	Professional Elective - VII	3	0	0	3	3
PRACTICALS							
1	24CIPJ801	Project Work - Phase II	0	0	12	12	6
VALUE ADDITIONS - VIII							
1	24CIIN801	Internship	0	0	9	9	3
Total						24	12

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PROFESSIONAL ELECTIVES - I

S. NO	COURSE CODE	COURSE TITLE	CREDIT	DOMAIN
1	24CIEL501	Dynamic Paradigm in IoT	3	IoT Technology
2	24ITEL512	Microprocessors and Interfacing	3	IoT Technology
3	24CIEL502	Sensors and Transducers	3	IoT Technology
4	24CIEL503	Software Testing	3	System and Computing
5	24CIEL504	App Development	3	System and Computing
6	24AMEL504	Object Oriented Software Engineering	3	System and Computing
7	24CIEL505	Sensors, Actuators and Signal Processing	3	Communication and Networking
8	24CIEL506	Computer Graphics and Multimedia	3	Communication and Networking
9	24CIEL507	4G/5G Communication Networks	3	Communication and Networking
10	24CIEL508	Intellectual Property Rights	3	Data Management
11	24ITEL511	Data Acquisition System	3	Data Management
12	24CIEL509	Brain Inspired Computing	3	Data Management
13	24SCEL505	Quantum algorithms	3	Artificial Intelligence
14	24CSEL511	Fundamentals of Edge and Soft Computing	3	Artificial Intelligence
15	24CIEL510	AI in Healthcare	3	Artificial Intelligence
16	24CIEL511	Introduction to Cyber Security	3	Cyber Security
17	24CIEL512	Ethical Hacking	3	Cyber Security
18	24CIEL513	Network Essentials and Security	3	Cyber Security

PROFESSIONAL ELECTIVES - II

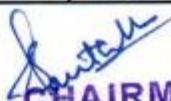
S. NO	COURSE CODE	COURSE TITLE	CREDIT	DOMAIN
1	24CIEL514	IoT Device Programming	3	IoT Technology
2	24CIEL515	Web of Things	3	IoT Technology
3	24CIEL516	System on chip Architecture	3	IoT Technology
4	24CIEL517	Software Project Management	3	System and Computing
5	24CIEL518	Digital Forensics	3	System and Computing
6	24CIEL519	Kotlin Programming	3	System and Computing
7	24CIEL520	Virtualization Technologies	3	Communication and Networking
8	24CIEL521	Bioinformatics	3	Communication and Networking
9	24CIEL522	Massive MIMO Networks	3	Communication and Networking
10	24CIEL523	Data Science for Internet of Things	3	Data Management
11	24CIEL524	Descriptive Analytics for IoT	3	Data Management
12	24CIEL525	Computational Neuroscience	3	Data Management
13	24CIEL510	Data Analytics using R	3	Artificial Intelligence
14	24CIEL526	Deep Learning Principles and Practices	3	Artificial Intelligence
15	24CIEL527	Algorithms for DNA Sequencing	3	Artificial Intelligence
16	24CIEL528	Blockchain and Cryptocurrency Technologies	3	Cyber Security
17	24CIEL529	IT Security Compliance and Forensics	3	Cyber Security
18	24CIEL530	Malware Analysis and Reverse Engineering	3	Cyber Security

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PROFESSIONAL ELECTIVES - III

S. NO	COURSE CODE	COURSE TITLE	CREDIT	DOMAIN
1	24CIEL601	Robotics and Applications	3	IoT Technology
2	24CIEL602	Artificial IoT	3	IoT Technology
3	24CIEL603	Embedded Real Time Systems	3	IoT Technology
4	24CIEL604	Game Programming	3	System and Computing
5	24CIEL605	Virtual Reality and Augmented Reality	3	System and Computing
6	24CIEL606	Multicore Architectures	3	System and Computing
7	24CIEL607	Social Network Analysis	3	Communication and Networking
8	24CIEL608	Software Defined Networks	3	Communication and Networking
9	24CIEL609	Underwater Imaging Systems And Image Processing	3	Communication and Networking
10	24AMEL607	Business Intelligence & Analytics	3	Data Management
11	24CIEL610	Web Analytics	3	Data Management
12	24CIEL611	Database Tuning	3	Data Management
13	24CIEL612	Artificial Intelligence And Edge Computing	3	Artificial Intelligence
14	24CIEL613	Pattern Recognition	3	Artificial Intelligence
15	24CIEL614	Human Computer Interaction	3	Artificial Intelligence
16	24CIEL615	Information Security	3	Cyber Security
17	24CIEL616	Information Theory & Coding	3	Cyber Security
18	24CIEL617	Cyber Attacks Detection and Prevention Systems	3	Cyber Security

PROFESSIONAL ELECTIVES - IV

S. NO	COURSE CODE	COURSE TITLE	CREDIT	DOMAIN
1	24CIEL618	Open Source Intelligence(OSINT)	3	IoT Technology
2	24CIEL619	Digital Twin Technology	3	IoT Technology
3	24CIEL620	IoT Architecture, Network & Security	3	IoT Technology
4	24CIEL621	Computer Vision3		System and Computing
5	24CIEL622	Green Computing	3	System and Computing
6	24CIEL623	Haskell Programming	3	System and Computing
7	24CIEL624	Speech Processing	3	Communication and Networking
8	24CIEL625	Cognitive Science	3	Communication and Networking
9	24CIEL626	6G Wireless Technologies	3	Communication and Networking
10	24CIEL627	Software Quality Assurance	3	Data Management
11	24CIEL628	Scientific Visualization Techniques	3	Data Management
12	24CIEL629	Advanced Data Structures and Algorithms	3	Data Management
13	24CIEL630	Business Intelligence	3	Artificial Intelligence
14	24CIEL631	Data and Visual analytics in AI	3	Artificial Intelligence
15	24CIEL632	High Performance Computing	3	Artificial Intelligence
16	24CIEL633	Information Theory & Coding	3	Cyber Security
17	24CIEL634	Web Application Security	3	Cyber Security
18	24CIEL635	Modern Cryptography	3	Cyber Security

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Academic Council Meeting

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Computer Science and Engineering
(Internet of Things)

PROFESSIONAL ELECTIVES - V

S. NO	COURSE CODE	COURSE TITLE	CREDIT	DOMAIN
1	24CIEL636	Sensors for Industrial Applications	3	IoT Technology
2	24CIEL637	IoT Design Protocols	3	IoT Technology
3	24CIEL638	Introduction To Industry 4.0 and Technologies	3	IoT Technology
4	24CIEL639	Advanced Java Programming	3	System and Computing
5	24CSEL608	Full Stack Software Development	3	System and Computing
6	24CIEL640	Software Design with UML	3	System and Computing
7	24CIEL641	Modern Digital Communication Techniques	3	Communication and Networking
8	24CIEL642	Advanced Wireless Communication Techniques	3	Communication and Networking
9	24ECEL619	Photonic Integrated Circuits	3	Communication and Networking
10	24ITEL603	Data Analytics with Python	3	Data Management
11	24AIEL511	Pandas For Data Analysis	3	Data Management
12	24CIEL643	NOSQL Databases	3	Data Management
13	24CIEL644	Data and Visual analytics in AI	3	Artificial Intelligence
14	24CIEL645	Generative AI	3	Artificial Intelligence
15	24AIEL601	Practical Machine Learning with TensorFlow	3	Artificial Intelligence
16	24CIEL646	Social Network Security	3	Cyber Security
17	24CIEL647	Cyber Physical Systems	3	Cyber Security
18	24AIEL620	Cyber Threat Intelligence	3	Cyber Security

PROFESSIONAL ELECTIVES - VI

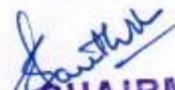
S. NO	COURSE CODE	COURSE TITLE	CREDIT	DOMAIN
1	24CIEL701	IoT Cloud Processing and Analytics	3	IoT Technology
2	24CIEL702	Service Oriented Architecture	3	IoT Technology
3	24CIEL703	Application of IoT in Robotics	3	IoT Technology
4	24AMEL505	Fuzzy Logic Systems	3	System and Computing
5	24CIEL704	Soft Computing	3	System and Computing
6	24CIEL705	App Development	3	System and Computing
7	24CIEL706	Aerial Vehicles Communications for 5G	3	Communication and Networking
8	24ECEL621	Signal Processing for mm Wave communication	3	Communication and Networking
9	24CIEL707	Millimeter Wave Personal Communication Systems	3	Communication and Networking
10	24CIEL708	Brain Computer Interface	3	Data Management
11	24CIEL709	Optimization Techniques in Machine Learning	3	Data Management
12	24AIEL606	Data Wrangling and Cleaning	3	Data Management
13	24CIEL710	AI in Telemedicine	3	Artificial Intelligence
14	24CIEL711	Deep Learning for Computer Vision	3	Artificial Intelligence
15	24CSEL505	Decision Support Systems	3	Artificial Intelligence
16	24CIEL712	Network Essentials and Security	3	Cyber Security
17	24CIEL713	Cyber Laws and Vulnerabilities	3	Cyber Security
18	24CIEL714	Data Privacy Regulations	3	Cyber Security

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Academic Council Meeting

No. 05 Dated: 17/04/25

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 Computer Science and Engineering
 (Internet of Things)

PROFESSIONAL ELECTIVES - VII

S. NO	COURSE CODE	COURSE TITLE	CREDIT	DOMAIN
1	24CIEL715	System on chip Architecture	3	IoT Technology
2	24CIEL716	Embedded Systems Design	3	IoT Technology
3	24ITEL712	Open source programming for IoT	3	IoT Technology
4	24CIEL717	Software Testing and Automation	3	System and Computing
5	24CIEL718	C++ for Embedded Systems	3	System and Computing
6	24ITEL501	Computer Graphics & Multimedia	3	System and Computing
7	24CIEL719	5G and beyond communication Networks	3	Communication and Networking
8	24CIEL720	Game Theory for Wireless Communication and Networking	3	Communication and Networking
9	24ECEL719	RF Measurements and Signal Analysis in Wireless Systems	3	Communication and Networking
10	24CIEL721	Supply Chain Analytics	3	Data Management
11	24CIEL722	Computational Neuroscience	3	Data Management
12	24ITEL504	Data Warehousing and Data Mining	3	Data Management
13	24CIEL723	Algorithms for DNA Sequencing	3	Artificial Intelligence
14	24CIEL724	Ethics and AI	3	Artificial Intelligence
15	24CSEL716	Artificial Intelligence Search Methods for Problem Solving	3	Artificial Intelligence
16	24CIEL725	Mobile and Wireless Security	3	Cyber Security
17	24CIEL726	Ethical Hacking and Social Engineering	3	Cyber Security
18	24CIEL727	Ransomware Defense Strategies	3	Cyber Security

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Academic Council Meeting

No. 05 Dated: 17/04/25

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1 Graduates will have a sound understanding of fundamental concepts of IoT.

PEO2 Graduates will be trained to gain domain expertise by applying the theory basics into practical situation through simulation and modeling techniques.

PEO3 Graduates will enhance the capability through skill development and make them Industry ready by inculcating leadership and multitasking abilities.

PEO4 Graduates will apply their expertise of the Internet of Things to research and Development and create novel products that benefit society.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1 The graduates will be able to develop and test integrated solutions for Internet of Things project development.

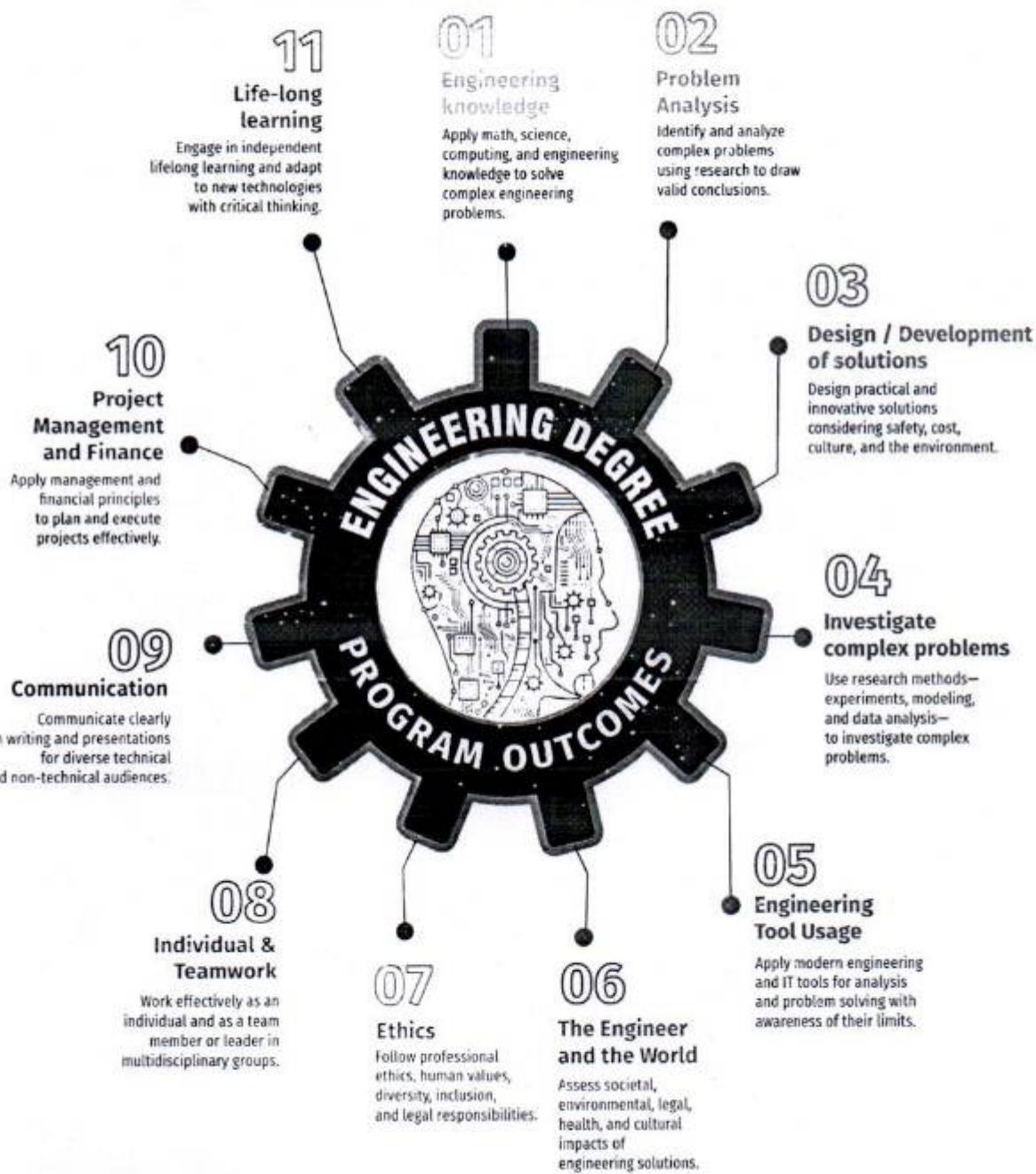
PSO 2 The graduates will be empowered with the skills and expertise required delivering industry and societal solutions in the area of Internet of Things.

COMPONENTS OF THE CURRICULUM (COC)

Course Component	Curriculum Content (% of total number of credits of the program)	Total number of contact hours	Total Number of credits
Basic Sciences (BS)	18	32	30
Engineering Sciences (ES)	7	17	12
Humanities and Social Sciences (HS)	8	13	13
Professional Electives (EL)	14	23	23
Program Core + Program Lab (PC+PL)	6	14	10
Program theory with Lab (PW) / Program Lab With Theory (PT)	14	30	24
Open Elective (OE)	13	35	21
Training & Placement (TP)	7	12	12
Innovation & Development (ID) / Project (PJ)	2	14	4
Internships (IN)	9	32	16
Mandatory Courses (MC)	2	9	3
Total	100	231	168

PROGRAMME OUTCOMES(POs)

PROGRAM OUTCOME REPRESENTS THE KNOWLEDGE, SKILLS
AND ATTITUDES THAT THE STUDENTS WOULD BE EXPECTED TO
HAVE AT THE END OF THE 4 YEAR ENGINEERING DEGREE PROGRAM



SEMESTER - I

24BSMA101 - SDG NO. 4	MATRICES AND CALCULUS	L	T	P	CP	C
		3	1	0	4	4

OBJECTIVES:

- To understand and gain the knowledge of matrix algebra.
- To introduce the concepts of limits, continuity, derivatives, maxima and minima for functions of several variables.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To provide understanding of double integration, triple integration and their applications.
- To impart the knowledge of Fourier series..

MODULE - I MATRICES 12

Eigenvalues and Eigenvectors of a real matrix – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton theorem (without proof) – Symmetric and orthogonal matrices - Reduce the Quadratic to Canonical form using orthogonal transformation - Nature of Quadratic forms.

MODULE - II FUNCTIONS OF SEVERAL VARIABLES 12

Limits, Continuity - Definitions - Partial derivatives -Taylor's series - Jacobians, Maxima and Minima - Method of Lagrange multipliers.

MODULE - III VECTOR DIFFERENTIATION 4

Scalar and Vector valued functions- Gradient and Directional derivatives – Tangent plane - Divergence and Curl- Irrotational and Solenoidal vector fields - Scalar and Vector Potentials - Vector identities (without proof).

MODULE - IV VECTOR INTEGRATION 8

Line integral over a plane curve - Surface integral - Area of a curved surface - Volume integral - Greens, Gauss divergence and Stoke's theorems -Verification and Application in evaluating line, Surface and Volume integrals. Problems involving Cube and Cuboids.

MODULE - V MULTIPLE INTEGRALS 12

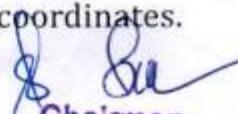
Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Change of variables from cartesian to polar coordinates-Triple integrals – Volume of solids - Change of variables from cartesian to Spherical and Cylindrical polar coordinates.

Recommended by

Board of Studies of H&S dept.

Meeting No. 6 Dated: 30/05/2018

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 Department of Humanities & Sciences

MODULE - VI FOURIER SERIES**12**

Fourier series – Convergence of Fourier series -Half range Sine and Cosine series – Parseval's theorem.

TOTAL: 60 PERIODS**TEXT BOOKS:**

1. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry, G.B. Thomas and R.L. Finney, 9th Edition, Pearson, Reprint, 2002.

REFERENCES:

1. Higher Engineering Mathematics, B. V. Ramana, 11th reprint, Tata McGraw-Hill, New Delhi, 2010.
2. Engineering Mathematics for first year, T. Veerarajan, Tata McGraw-Hill, New Delhi, 2008.
3. A text-book of Engineering Mathematics, N.P. Bali and Manish Goyal, 9th Edition, Laxmi Publications, Reprint, 2008.
4. Higher Engineering Mathematics, B. S. Grewal, 40th Edition, Khanna Publishers, New Delhi, 2007.

WEB REFERENCES:

1. <https://math.mit.edu/~gs/linearalgebra/ila0601.pdf>
2. <http://ocw.mit.edu/ans7870/18/18.013a/textbook/HTML/chapter30/>
3. <https://ocw.mit.edu/courses/mathematics/18-02sc-multivariable-calculus-fall-2010/2.-partial-derivatives/>
4. <http://ocw.mit.edu/ans7870/18/18.013a/textbook/HTML/chapter31/>

ONLINE RESOURCES:

1. <https://www.khanacademy.org/math/linear-algebra/alternate-bases/eigen-everything/v/linear-algebra-introduction-to-eigenvalues-and-eigenvectors>
2. <https://www.khanacademy.org/math/differential-calculus>

COURSE OUTCOMES:

Upon completion of the course, the student should be able to:

1. Diagonalize the matrix using orthogonal transformation and apply Cayley Hamilton Theorem to find the inverse and integral powers of a square matrix. (K3)
2. Evaluate the limit, examine the continuity and use derivatives to find extreme values for functions of several variables. (K3)

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3. Compute the derivatives of scalar and vector point functions. (K3)
4. Use the vector point function to establish the relation between line, surface and volume integrals. (K3)
5. Apply double and triple integrals to find the area and the volume of a region. (K3)
6. Compute Fourier series expansion of a function. (K3)

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-
CO6	3	2	2	-	-	-	-	-	-	-	-

SEMESTER - I

24HSEN101 - SDG NO. 4	COMMUNICATIVE ENGLISH	L T P CP C				
		3	0	0	3	3

OBJECTIVES:

- Develop the basic LSRW skills
- Acquire enhanced knowledge of English grammar
- Improve modern and technical vocabulary
- Enhance the communicative and cognitive skills
- Interpret the texts and write reviews critically

MODULE - I COMMUNICATION PROCESS

8

Listening - informal conversations - Speaking - basics in speaking - speaking on given topics & situations - recording speeches and strategies to improve - Reading comprehension - skimming/ scanning/ predicting - question & answers - objective and descriptive answers - Writing - paragraph writing, personal notes - Language Development - parts of speech, prefix, suffix, word formation

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MODULE - II LANGUAGE BARRIERS, LEVELS AND CHANNELS 8

Listening -interviews - Speaking - describing a simple process - asking and answering questions - Reading - critical reading - finding key information in a given text - ideation, mind mapping - Writing - dialogue,, instructions - Language Development - regular, irregular verbs, tenses, framing questions,

MODULE - III NARRATION AND SUMMATION 8

Listening - long texts - TED talks - extensive speech on current affairs - Speaking - role plays - asking about routine actions and expressing opinions - Reading- longer texts & making a critical analysis of the given text - Writing - essay (comparative / analytical), jumbled sentences, recommendations - Language Development - writing single sentence definitions, sequence words

MODULE - IV WRITING MECHANICS 7

Listening -debates and discussions - practicing multiple tasks -Speaking - self introduction about friends/ places/ hobbies - Reading -Making inference from the reading passage - Predicting the content of the reading passage - Writing - informal letters, e-mails - accuracy, coherence, brevity - Language Development- single word substitutes, compound words-conditionals

MODULE - V INTERPRETATION SKILLS 7

Listening- popular speeches and presentations - Speaking - impromptu speeches -Reading - articles - magazines - Writing - review writing, channel conversion - bar diagram/ table, poster/ picture interpretation - Language Development - modal verbs, collocations, 21st century vocabulary

MODULE - VI COGENT EXPOSITIONS 7

Listening - Motivational speeches - Speaking - Debates and discussion - Reading - analytical reading - newspapers - Writing - process description - Language Development - voices, sentences expressing purpose, synonyms & antonyms

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Board of Editors. Using English: A Coursebook for Undergraduate Engineers and Technologists. Orient Blackswan Limited, Hyderabad: 2015.
2. A Course in Technical English, D. Praveen Sam and K.N. Shoba, Cambridge University Press, 2020

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Meeting No. 6 Dated: 30/05/2024

| 4 |


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REFERENCES:

1. Anderson, Paul V. Technical Communication: A Reader – Centered Approach. Cengage, New Delhi, 2008.
2. Smith-Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage, Mason, USA, 2007.
3. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford, 2007.
4. Chauhan, Gajendra Singh and et.al. Technical Communication (Latest Revised Edition). Cengage Learning India Pvt. Limited, 2018.

WEB REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc19_hs31/preview
2. https://www.myenglishpages.com/speaking/#google_vignette

ONLINE RESOURCES:

1. <https://wwwPearson.com/english/catalogue/business-english/technical-english.html>
2. <https://www.cambridgeenglish.org/learning-english/free-resources/>

OUTCOMES:**Upon completion of the course, the student will be able to:**

1. Improve understanding and application of listening, speaking, reading, and writing skills (K2)
2. Demonstrate the ability to write personal notes, clear and coherent paragraphs (K2)
3. Apply analytical skills to write essays, rearrange jumbled sentences, and formulate recommendations (K3)
4. Apply skills to develop email etiquette and construct professional emails and informal letters (K3)
5. Analyze and interpret data to write comprehensive and effective reviews (K3)
6. Enhance vocabulary, improve grammatical accuracy, and confidently engage in debates (K2)

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CO-PO, PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	3	-	2	-	-
CO2	-	-	-	-	-	-	-	-	3	-	2	-	-
CO3	-	-	-	-	-	-	-	-	3	-	2	-	-
CO4	-	-	-	-	-	-	-	-	3	-	2	-	-
CO5	-	-	-	-	-	-	-	-	3	-	2	-	-
CO6	-	-	-	-	-	-	-	-	3	-	2	-	-

SEMESTER - I

24BSPH101 - SDG NO. 4,7,9,11	ENGINEERING PHYSICS	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To understand the basic concepts of mechanics and its use in engineering applications.
- To understand the concept of waves and lasers and its applications.
- To illustrate the various laws of electromagnetic waves and its applications.
- To apply the concepts of quantum mechanics to engineering studies.
- To understand the basics of crystal for engineering applications.
- To identify the basic principles involved in thermal physics and its applications.

MODULE - I PROPERTIES OF MATTER

8

Elasticity - Hooke's law- Poisson's ratio - Stress - strain diagram and its uses - Twisting couple - shaft - Torsion pendulum: theory and experiment - bending of beams - bending moment - cantilever: theory and experiment - uniform and non-uniform bending: theory and experiment - I-shaped girders.

MODULE - II MECHANICAL WAVES AND LASERS

7

Waves on a string – standing waves – traveling waves – Energy transfer of a wave – Reflection and refraction of light waves – interference -Theory of air wedge and experiment - Theory of laser – characteristics – Spontaneous and stimulated emission – Einstein's coefficients – population inversion – Nd-YAG laser, CO₂ laser – Basic applications of lasers in industry.

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Meeting No. 6 Dated: 30/09/2019

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MODULE - III ELECTROMAGNETIC WAVES

8

The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM - Reflection and transmission of electromagnetic waves from a non-conducting medium vacuum interface for normal incidence.

MODULE - IV BASIC AND APPLIED QUANTUM MECHANICS

7

Black body radiation - Planck's derivation - Electrons and matter waves -The Schrodinger equation (Time dependent and time independent forms) - significance of wave function - Normalization -Free particle - particle in a infinite potential well: 1D, 2D and 3D Boxes; - Barrier penetration and quantum tunneling (qualitative) - Scanning Tunneling Microscope.

MODULE - V CRYSTAL PHYSICS

8

Single crystalline, Polycrystalline and Amorphous materials - single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal - Miller indices - Interplanar distance - X-Ray diffraction - Calculation of number of atoms per unit cell - Atomic radius - Coordination number - packing. factor for SC, BCC, FCC and HCP structures - Polymorphism and allotropy. Crystal Growth: Chochralski technique - Molecular beam epitaxy.

MODULE - VI THERMAL PHYSICS

7

Transfer of heat energy - Conduction, Convection and Radiation - Thermal conductivity, Forbe's method and Lee's disc method - Conduction through compound media - series and parallel methods - Heat exchangers - Refrigerators and Solar water heaters.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. D.K. Bhattacharya & T.Poonam, "Engineering Physics". Oxford University Press, 2015.
2. R.K. Gaur & S.L. Gupta, "Engineering Physics". Dhanpat Rai Publishers, 2012.
3. B.K. Pandey & S.Chaturvedi, "Engineering Physics", Cengage Learning India, 2017.
4. V. Rajendran, "Engineering Physics", Mc Graw Hill Publications Ltd. New Delhi, 2014.
5. M.N. Avadhanulu And P.G. Kshirsagar, "A textbook of Engineering Physics", S.Chand & Co Ltd. 2016.

Recommended by

Board of Studies of HAS dept.
Meeting No. 6 Dated: 30/08/2014

| 7 |


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REFERENCES:

1. D. Halliday, Resnick & J. Walker, "Principles of Physics", Wiley, 2015.
2. R.A. Serway, & J.W. Jewett, "Physics for Scientists and Engineers", Cengage Learning, 2010.
3. N.K. Verma, "Physics for Engineers", PHI Learning Private Limited, 2014.
4. P.A. Tipler & G. Mosca "Physics for Scientists and Engineers", W.H.Freeman, 2020.
5. Brijlal and Subramanyam, "Properties of Matter", S. Chand Publishing, 2018.
6. Shatendra Sharma & Jyotsna Sharma, "Engineering Physics", Pearson, 2018.
7. Arthur Beiser. "Concepts of Modern Physics", McGraw-Hill, 6th Edition. 2003.
8. Charles Kittel, "Introduction to Solid State Physics". John Wiely & Sons. 8th Edition, 2005.

OUTCOMES:**Upon completion of the course, the student will be able to:**

1. Apply the concepts of stress, torsion, and bending to study the mechanical behavior of structural elements using theoretical and experimental methods. (K3)
2. Analyze wave phenomena and interference to study energy transfer, and evaluate laser principles with their industrial applications. (K4)
3. Examine Maxwell's equations and electromagnetic wave theory to analyze wave propagation, polarization and reflection-transmission phenomena in different media (K4)
4. Utilize the principles of quantum mechanics to explain black body radiation, matter waves, particle confinement in potential wells and tunneling phenomena. (K3)
5. Examine and compare the characteristics of various crystal structures, polymorphic forms, and crystal growth techniques. (K4)
6. Apply the principles of heat transfer to determine the thermal conductivity and explain the role of heat exchangers in refrigerators and solar water heaters. (K3)

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dept.

Meeting No. 6

Dated: 30/09/2020



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CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-
CO6	3	-	-	-	-	-	-	-	-	-	-

SEMESTER - I

24BSCY101	ENGINEERING CHEMISTRY	L	T	P	CP	C
SDG NO. 4,7,8,9,11,12,17		3	0	0	3	3

OBJECTIVES:

- To enumerate the importance, synthesis, and applications of polymers.
- To impart basic knowledge of chemistry and the principles involved in electrochemistry, energy storage devices, and their commercial applications.
- To familiarize the fundamental laws and concepts of important photophysical and photochemical processes, as well as spectroscopy.
- To explore the fundamental concepts, laws, and principles of thermodynamics, and apply its derivations to optimize and innovate engineering processes across various disciplines.
- To comprehend the chemistry of fuels and combustion, and their applications across various engineering and industrial processes.
- To gain an understanding of the emergence and challenges of nanomaterials and nanotechnology across various scientific and technological disciplines.

MODULE - I POLYMER CHEMISTRY

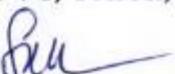
8

Polymers: Definition, Degree of polymerization, Functionality of monomer, Classification of polymer with examples, Types of polymerization, Mechanism of addition polymerization (Free radical mechanism).

Plastics: Definition and Characteristics - Thermoplastics & Thermosets. Preparation, properties and engineering applications of plastics -PVC, Teflon,

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Fibers: Characteristics fibers - Preparation, properties and applications of Nylon and Dacron. Biodegradable polymers & Conducting Polymers: Characteristics, Classification and their applications.

MODULE - II ELECTROCHEMISTRY AND BATTERY TECHNOLOGY 7

Electrochemistry: Types of Cells (Electrochemical and Electrolytic cell) - Redox reaction - Single and Standard electrode potential, Reference electrodes - SHE, Calomel electrode, Measurement of Single Electrode Potential, Nerns't equation (Derivation & Problems), Electrochemical series and its significance.

Batteries: Evolution of batteries - Primary and Secondary battery (Lead acid battery), Next Generation Battery Technology (NGBT) - Solid-state batteries (Lithium-ion), Sodium-ion batteries.

MODULE - III PHOTOCHEMISTRY & SPECTROSCOPY 7

Photochemistry: Laws of photochemistry - Grotthuss-Draper law, Stark-Einstein law and Lambert-Beer Law. Quantum efficiency - determination- Photo processes - Jablonski diagram (Internal Conversion, Intersystem crossing, Fluorescence, Phosphorescence), Chemiluminescence and Photo-sensitization.

Spectroscopy: Electromagnetic spectrum - Absorption of radiation - Electronic, Vibrational and Rotational transitions. UV-visible and IR spectroscopy - principles, instrumentation (Block diagram only).

MODULE - IV CHEMICAL THERMODYNAMICS 8

Terminology of Thermodynamics - Laws of Thermodynamics - I law - Significance - Mathematical formulation and its applications. II law - Need for the II law. Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes, entropy of phase transitions; Clausius inequality. Helmholtz and Gibbs free energy functions, Criteria of spontaneity, Maxwell relations, Gibbs-Helmholtz equation, Van't Hoff Isotherm and Isochore.

MODULE - V FUELS 8

Fuels: Introduction -Classification of fuels - Coal - Analysis of coal (proximate and ultimate). Carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - Petroleum - manufacture of synthetic petrol (Bergius process). Knocking - Octane number and Cetane number - Gaseous fuels - Compressed natural gas (CNG), Liquefied petroleum gas (LPG). Biofuels - Gobar gas and Biodiesel.

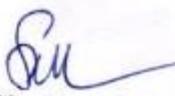
Combustion of fuels: Introduction - Calorific value - Higher and Lower Calorific values- Theoretical calculation of Calorific value(Dulong formula) - Flue gas analysis (DORSET Method).

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MODULE - VI NANO CHEMISTRY

7

Introduction - Types of nanomaterials - Emergence and challenges in nanotechnology- Synthesis routes for nanomaterials: Bottom-up and top-down approaches - Sol-gel, precipitation, Thermolysis, Laser ablation, Chemical Vapour Deposition (CVD), Electro deposition - Properties of nanomaterials- Mechanical properties, Chemical, Optical, Electrical and Magnetic properties-applications of nanomaterials (Gold nanoparticles as an example). Quantum Dots - concept, properties and applications.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2015.
2. P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2015.
3. S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT, LTD, New Delhi, 2013.
4. Ravikrishnan A, 'Engineering Chemistry', Sri Krishna Hitech Publishing Company Pvt. Ltd, New Edition 2024.

REFERENCES:

1. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
2. Prasanta Rath, "Engineering Chemistry", Cengage Learning India PVT, LTD, Delhi, 2015.
3. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, 2015.
4. Chemistry of Nanomaterials Vol.1 S.S.R Kumar Challa (Ed).
5. Advanced chemistry by Phillip Matthews Vol.1 and Vol.2.
6. Chemistry in Engineering and Technology Vol. 1 & 2, J.C. Kuriacose and J. Rajaram.
7. Applied chemistry - A textbook for Engineers and Technologists by H.D. Gesser.
8. Chemical and Electrochemical Energy Systems, R. Narayanan, B. Viswanathan, University Press India Limited.

OUTCOMES:

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

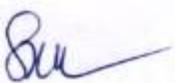
1. Explain the importance of polymers in science and technology, describe their roles in different applications and discuss their impacts on modern advancements. (K3)

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- Recognize the basic principles of electrochemistry and describe their application in battery technologies. (K3)
- Apply the concepts of key photophysical and photochemical processes, as well as spectroscopy, to develop and optimize various applications. (K3)
- Describe the principles of the second law of thermodynamics and its derivations to analyze engineering applications across all disciplines. (K3)
- Categorize the chemistry of fuels and combustion and their applications at various levels. (K3)
- Demonstrate the knowledge of nanomaterials, including their properties, behavior, interactions and applications across various disciplines of science and technology. (K3)

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	3	-	-	2	-	-	-	-	-
CO2	3	3	3	-	-	2	-	-	-	-	-
CO3	3	2	3	-	2	-	-	-	-	-	-
CO4	3	2	3	-	-	1	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-
CO6	2	1	2	-	-	-	-	-	-	-	-

SEMESTER - I

24ESCS101 106105171 SDG NO. 4 & 9	PROBLEM SOLVING AND PROGRAMMING IN C	L	T	P	CP	C
		3	0	0	4	0

OBJECTIVES:

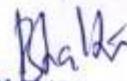
- Interpret Mathematical problems using algorithms, flowchart and pseudocode.
- To understand the programming language.
- To develop C Programs using basic Programming Constructs, Loops, Arrays and Strings.
- To develop applications in C using Functions, Pointers and Structures.
- To perform I/O operations and File Handling in C.

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Meeting No. 8 Dated: 09/04/25

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MODULE - I INTRODUCTION TO PROGRAMMING AND ALGORITHMS FOR PROBLEM SOLVING 7

Introduction to Problem Solving through programs- Algorithm-Flowchart-Pseudocode-Memory, Variables, Values, Instructions, Programs-compilation process-Syntax and Semantic Errors- The language of C : Phases of developing a running computer program in C - Character set - Constants - Keywords - Primitive data types -Declaration, Type Conversion.

MODULE - II BASICS OF C PROGRAMMING 7

Sequential- Arithmetic Operators, Relational Operators, Logical Operators, Increment Decrement Operators, Bitwise Operators, Assignment Operators and Expressions, Precedence and Order of Evaluation, selective - If, Else-If, Switch- repetitive structures-for, while, do while, Nested loops, go to, break, continue -Finding maximum of 3 numbers, Unit converters, Interest calculators, multiplication tables, GCD and LCM, Prime number generation.

MODULE - III ARRAYS AND STRINGS 8

Introduction to Arrays: Declaration, Initialization – One Dimensional Array – Example Program: Computing Mean, Median and Mode - Two Dimensional Arrays - Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) - String Operations: Length, Compare, Concatenate - Copy - Selection Sort - Linear and Binary Search.

MODULE - IV FUNCTIONS AND POINTERS 9

Introduction to Functions: Function Prototype, Function Definition, Function Call, Built-in Functions (String Functions, Math Functions) – Recursion – Example Program: Computation of Sine Series - Scientific Calculator using Built-in Functions - Binary Search using Recursive Functions - Factorial and Fibonacci Generation - Towers of Hanoi problem - - Pointers - Pointer Operators - Pointer Arithmetic - Arrays and Pointers -Array of Pointers - Example Program: Sorting of Names – Parameter Passing: Pass by Value - Pass by Reference – Example Program: Swapping of Two Numbers using Pass by Reference.

MODULE - V STRUCTURES 7

Structure - Nested Structures – Pointer and Structures – Array of Structures – Example Program using Structures and Pointers – Self Referential Structures – Dynamic Memory Allocation - Singly Linked List - Typedef.

MODULE - VI FILE PROCESSING 7

Files – Types of File Processing: Sequential Access, Random Access – Sequential Access File - Example Program: Finding Average of Numbers stored in Sequential Access File - Random Access File - Example Program:

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Transaction Processing Using Random Access Files – Command Line Arguments.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. R.G. Dromey, "How to solve it by Computers", Reprint, PHI Publishers, 2011.
2. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2018.
3. Kernighan, B.W and Ritchie D.M, "The C Programming language", Second Edition, Pearson Education, 2015.

REFERENCES:

1. Yashwant Kanetkar, "Let us C", 18th Edition, BPB Publications, 2021.
2. Byron Gottfried, "Programming with C", Fourth Edition, Tata McGraw Hill Education, 2018.
3. Paul Deitel and Harvey Deitel, "C How to Program", Seventh edition, Pearson Publication, 2015.
4. Jeri R. Hanly & Elliot B. Koffman, "Problem Solving and Program Design in C", Pearson Education, 2013.
5. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009.
6. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
7. Hanly J R & Koffman E.B, "Problem Solving and Programme design in C", Pearson Education, 2009.

WEB REFERENCES:

1. <https://www.learn-c.org/>
2. <https://codeforwin.org/>
3. <https://www.cprogramming.com>

ONLINE RESOURCES:

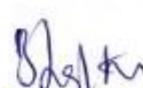
1. https://www.linuxtopia.org/online_books/programing_books/gnu_c_programming_tutorial
2. <https://nptel.ac.in/courses/106105171>
3. https://swayam.gov.in/nd1_noc19_cs42/preview

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OUTCOMES:**Upon completion of the course, the student will be able to:**

1. Solve basic problems using algorithms, flowcharts, and pseudo code.(K3)
2. Analyze the various programming constructs for basic computational problems.(K4)
3. Implement simple C programs using arrays and strings. (K3)
4. Use functions, recursion, and pointers to perform calculations, searching, and sorting.(K3)
5. Apply structures and dynamic memory allocation in handling complex programming tasks. (K3)
6. Organize sequential and random file processing techniques to provide solutions for real-world computational problems. (K4)

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	2	2
CO2	-	3	-	-	-	-	-	-	-	-	-	2	2
CO3	3	-	-	-	-	-	-	-	-	-	-	1	2
CO4	-	3	-	-	-	-	-	-	-	-	-	2	2
CO5	-	3	-	-	-	-	-	-	-	-	-	2	3
CO6	-	-	3	-	-	-	-	-	-	-	-	3	3

SEMESTER - I

24ESGE101 - SDG NO. 4,6,7,9,12, 14 & 15	ENGINEERING GRAPHICS	L	T	P	CP	C
		1	2	0	3	3

OBJECTIVES:

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To visualize the job in three dimensions.
- To have a clear conception and appreciation of the shape, size, proportion and design.
- To expose the student community to existing national standards related to technical drawings.

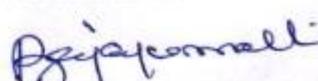
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MODULE - I PLANE CURVES**6+4**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid on Horizontal Surfaces – Drawing of tangents and normal to the above curves.

MODULE - II PROJECTION OF POINTS, LINES AND PLANES**6+4**

Projection of Points (Concept only). Projection (Elevation and Plan) of straight lines, inclined to both reference planes by rotating line method. Projection of plane surfaces, inclined to one of the reference planes by rotating object method.

MODULE - III PROJECTION OF SOLIDS**6+4**

Projection of regular solids (Prisms, Pyramids, Cylinder and cone) in first quadrant, by rotating object method when the axis is inclined to one of the reference planes.

MODULE - IV ORTHOGRAPHIC PROJECTION**6+4**

Orthographic Projection - Principles of orthographic projections, Orthographic projection of objects from pictorial view.

MODULE - V SECTION AND DEVELOPMENT OF LATERAL SURFACE 6+4

Projection of sectioned solids (Prisms, Pyramids, Cylinder and cone) and true shape of the sections, when the axis of the solid is perpendicular to HP alone and cutting plane inclined to HP only. Development of lateral surfaces of sectioned regular vertical solids (Prisms, Pyramids, Cylinder and Cone) with cutting plane inclined to HP only.

MODULE - VI ISOMETRIC PROJECTIONS**6+4**

Isometric projection – Principle, isometric scale, Isometric views and Isometric projections of truncated solids - Prisms, Pyramids, Cylinder and Cone in simple vertical positions only.

TOTAL: 60 PERIODS**TEXT BOOKS:**

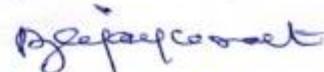
1. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2011.
2. T. Jeyapoovan, "Engineering Graphics using AUTOCAD", Vikas Publishing House Pvt Ltd, 7th Edition.

REFERENCES:

1. N S Parthasarathy and Vela Murali, "Engineering Graphics", Oxford University Press, New Delhi, 2015.

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2. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.
3. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.

WEB REFERENCES:

1. <https://archive.nptel.ac.in/courses/112/102/112102304/>

ONLINE RESOURCES:

1. <https://nptel.ac.in/courses/105/104/105104148/>
2. <https://nptel.ac.in/courses/112/103/112103019/>

OUTCOMES:

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

1. Perform free hand drawing of conical sections and cycloids. (K3)
2. Sketch the orthographic projection of lines and plane surfaces of rectangle, square, pentagon and Hexagon. (K3)
3. Draw the orthographic projection of regular solids like prism, pyramids, cylinder and cone using change of position method. (K3)
4. Draw plan, elevation and side views for the 3dimensional isometric drawing by using the concepts of orthographic projection. (K3)
5. Draw the section and development of lateral surfaces for the regular solids like Prism, Pyramid, Cylinder and Cone for the axis perpendicular to HP. (K3)
6. Draw the isometric view, projection for regular and truncated solids like Prism, Pyramid, Cylinder and Cone. (K3)

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	3	-	-	-	-	-	-	-	2	-	-	-	3
C02	3	-	-	-	-	-	-	-	2	-	-	-	3
C03	3	-	-	-	-	-	-	-	2	-	-	-	3
C04	3	-	-	-	-	-	-	-	3	-	-	-	3
C05	3	-	-	-	-	-	-	-	2	-	-	-	3
C06	3	-	-	-	-	-	-	-	3	-	-	-	3

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Dipak Chawla

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SEMESTER - I

24HSTA101 - SDG NO. 4	HERITAGE OF TAMILS	L	T	P	CP	C
		1	0	0	1	1

OBJECTIVES:

- Develop interest for classical language and literature to promote Tamil heritage
- Understand the ancient Tamil sculptures, folk and martial arts and contribution of Tamil to the freedom of India

அலகு I மொழி மற்றும் இலக்கியம்

இந்திய மொழிக் குடும்பங்கள் — திராவிட மொழிகள் — தமிழ் ஒரு செம்மொழி — தமிழ் செவ்விலக்கியங்கள் — சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை — சங்க இலக்கியத்தில் பகிர்தல் அறம் — திருக்குறளில் மேலாண்மைக் கருத்துகள்

UNIT I LANGUAGE AND LITERATURE

5

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

அலகு II இடைகால மற்றும் நவீன இலக்கியங்கள்

தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பெளத்து சமயங்களின் தாக்கம்- பக்தி இலக்கியம் — ஆழ்வார்கள் மற்றும் நாயன்மார்கள் — சிற்றிலக்கியங்கள் — தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி — தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு

Unit II MEDIEVAL AND MODERN LITERATURE

5

Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyan and Bharathidhasan.

அலகு III மரபு ஓரை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை

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

UNIT III HERITAGE - ROCK ART PAINTINGS TO MODERN ART - SCULPTURE 5

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 > Veena > Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

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அலகு IV நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்
 தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

UNIT IV FOLK AND MARTIAL ARTS

5

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

அலகு V தமிழர்களின் தினைக் கோட்பாடுகள்

தமிழகத்தின் தாவரங்களும், விலங்குகளும் — தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் — தமிழர்கள் போற்றிய அறக்கோட்பாடு — சங்க காலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் — சங்ககால நகரங்களும் துறைமுகங்களும் — சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி — கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

UNIT V THINAI CONCEPT OF TAMILS

5

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.

அலகு VI இந்திய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு

இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு — இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தூக்கம் — சுயமரியாதை இயக்கம் — இந்தியமருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு — கல்வெட்டுகள், கையெழுத்துப்படிகள் — தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

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

5

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

TOTAL: 30 PERIODS

TEXT-CUM-REFERENCE BOOKS

- தமிழக வரலாறு — மக்களும் பண்பாடும் — கே.கே. பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்)
- கணினித் தமிழ் — முனைவர் இல.சுந்தரம் (விகடன் பிரசரம்)
- கீழடி — வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
- பொருநை — ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
- Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)

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6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian> Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - „Sangam City Civilization on the banks of river Vaigai... (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation> Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation> Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

OUTCOMES:

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

1. மொழிக் குடும்பங்களின் வரலாறு மற்றும் தமிழ் இலக்கியங்களை மதிப்பிடுகிறார்கள் Students evaluate the history of language families and Tamil literatures (K3)
2. பக்தி மரபுகளின் தாக்கம் பெற்ற தமிழ் இலக்கியங்களைப் புரிந்துகொள்கிறார்கள் Students understand Tamil literatures influenced by Philosophical and religious traditions (K3)
3. தமிழகத்தின் பாறை, சிற்பம், ஓவியம்- கலை மரபுகளைப் பகுப்பாய்வு செய்கிறார்கள் Students analyze the artistic traditions of Tamil Nadu such as rock art, sculpture, and painting (K3)
4. தமிழக நாட்டுப்புறக் கலைகள் மற்றும் தற்காப்புக் கலைகளின் மாண்புகளை உணர்ந்து கொள்கிறார்கள் Students realize the significance of Tamil Nadu's folk arts and martial arts (K3)
5. பழந்தமிழின் திணையியல் வாழ்வியலை மீளாய்வு செய்கிறார்கள் Students re-examine the ecological lifestyle (Thinai-based life) of the ancient Tamils (K3)
6. தேசிய இயக்கம் மற்றும் இந்தியப் பண்பாட்டில் தமிழர்களின் பங்களிப்பினை நினைவுகூர்கிறார்கள் Students recall the contribution of Tamils to the National Movement and Indian culture (K3)

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CO-PO, PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	2	3	3	-	-	-	-	-	-	-	2	2	2
C02	2	3	3	-	-	-	-	-	-	-	2	2	2
C03	2	3	3	-	-	-	-	-	-	-	2	2	2
C04	2	3	3	-	-	-	-	-	-	-	2	2	2
C05	2	3	3	-	-	-	-	-	-	-	2	2	2
C06	2	3	3	-	-	-	-	-	-	-	2	2	2

SEMESTER - I

24BSPL101 - SDG NO. 6,11,12,17	PHYSICS AND CHEMISTRY LABORATORY	L T P CP C				
		0	0	4	4	2

PHYSICS LABORATORY (Any Five Experiments to be conducted)

OBJECTIVES:

- Demonstrate the wave nature of light using diffraction and interference properties.
- Study the thermal conductivity of a bad conductor.
- Verify experimentally the elastic properties of materials.

Sl.No. Name of the Experiment

- 1 (a) Determination of wavelength of Laser
(b) Determination of numerical aperture and acceptance angle in an optical fiber.
(c) Determination of particle size using laser source.
- 2 Determination of thermal conductivity of a bad conductor - Lee's Disc method.

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Meeting No. 6 Dated: 30/08/2019



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- 3 Determination of Young's modulus by non-uniform bending method.
- 4 Determination of the period of oscillation of a given torsional pendulum for a fixed length and find the rigidity modulus of the wire.
- 5 Find out the thickness of the given wire by air wedge method.
- 6 Calculation of lattice cell parameter – X-ray diffraction method.
- 7 Determination of Planck's constant.
- 8 Determination of wavelength of mercury spectrum – spectrometer grating.
- 9 Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.
- 10 Determination of band gap of a semiconductor.
- 11 Determination of Hall coefficient by Hall Effect experiment.
- 12 Determination of solar cell characteristics.

CHEMISTRY LABORATORY (Any Five Experiments to be conducted)

OBJECTIVES:

- To acquaint students with practical knowledge of the basic concepts of chemistry that they will encounter during their studies and in the industry and engineering fields.
- To acquaint students with the determination of the molecular weight of a polymer by viscometry.
- To develop and understand the basic concepts of acidic and basic nature using pH.

Sl.No. Name of the Experiment

- 1 Conductometric titration of strong acid vs strong base.
- 2 Determination of chloride content of water sample by Argentometric method.
- 3 Determination of strength of acids in a mixture of acids using conductivity meter.
- 4 Determination of total, temporary & permanent hardness of water by EDTA method.
- 5 Estimation of iron content of the given solution using potentiometer.
- 6 Determination of DO content of water sample by Winkler's method.
- 7 Determination of strength of given hydrochloric acid using pH meter.

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- 8 Estimation of iron content of the water sample using spectrophotometer (1,10- Phenanthroline / thiocyanate method).
- 9 Estimation of Sodium and Potassium in the given sample of water using Flame Photometer.
- 10 Determination of molecular weights of polymer samples using Ostwald's Viscometer.
- 11 Synthesis of nano-CdS by precipitation. (Demonstration only)
- 12 Corrosion experiment-weight loss method.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Engineering Physics Lab, Dr. G. Senthil Kumar, VRB publishers. (2019)
2. Engineering Physics Practical, Dr. P. Mani, Dhanam Publications. (2020)

TEXTBOOK:

1. Vogel's Textbook of Quantitative Chemical Analysis (8th edition, 2014).
2. Practical Physical chemistry by B. Viswanathan, P. S. Raghavan (Vivabooks), 2009.
3. Foundation of Experimental Chemistry by Jubraj B. Baruah, ParikshitGogoi, 2010.

OUTCOMES:

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

1. Apply the principles of elasticity and thermal physics to evaluate the various modulus of elasticity and conductivity of a bad conductor. (K3)
2. Explicate the properties of semi conductors by evaluating the band gap, I-V characteristics of solar cell and Hall effect of the materials. (K3)
3. Describe multiple measurement techniques, including volumetric titrations, conductivity, pH, redox potential and optical density measurements, used to estimate the amount of substance present in a solution. (K3)
4. Apply spectroscopic techniques, viscometry, synthesize nano particles, analyze the corrosion behaviour of materials in different environments. (K3)

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CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	-	-	2	-	-	-	-	-	2
CO2	3	3	-	-	2	-	-	-	-	-	2
CO3	3	3	-	-	2	-	-	-	-	-	2
CO4	3	3	-	-	2	-	-	-	-	-	2

SEMESTER - I

24ESPL101 - SDG NO. 4 & 9	PROGRAMMING IN C LABORATORY	L	T	P	CP	C
		0	0	2	2	1

OBJECTIVES:

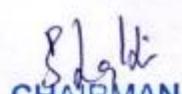
- To develop programs in C using basic Programming Constructs.
- To develop applications in C using Arrays and Strings.
- To design and implement applications in C using Functions, Structures.
- To develop applications in C using Files.

LIST OF EXPERIMENTS

1. Write a program using I/O statements and expressions.
2. Write programs using decision-making constructs.
3. Write a program to find whether the given year is a leap year or not?
(Hint: not every century is a leap. For example 1700, 1800 and 1900 is not a leap year).
4. Write a program to perform the Calculator operations, namely, addition, subtraction, multiplication, division and square of a number.
5. Write a program to check whether a given number is an Armstrong number or not.
6. Write a program to check whether a given number is odd or even.
7. Write a program to find the factorial of a given number.
8. Write a program to find out the average of 4 integers.
9. Write a program to print half pyramid of *.
10. Write a program to display array elements using two dimensional arrays.
11. Write a program to perform swapping using a function.
12. Write a program to display all prime numbers between two intervals using functions.
13. Write a program to solve towers of Hanoi using recursion.

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Board of Studies of CSE dept.Meeting No. 8 Dated: 09/4/24**CHAIRMAN**

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Sri Sairam Engineering College

14. Write a program to get the largest element of an array using the function.
15. Write a program to concatenate two strings.
16. Write a program to find the length of String.
17. Write a program to find the frequency of a character in a string.
18. Write a program to store Student Information in Structure and Display it.
19. The annual examination is conducted for 10 students for five subjects.
Write a program to read the data and determine the following:
 - (a) Total marks obtained by each student.
 - (b) The highest marks in each subject and the marks of the student who secured it.
 - (c) The student who obtained the highest total marks.
20. Write a program to demonstrate file operations (e.g. count the number of characters, words and lines in a file, replace a specific word with the given word in the same file).

TOTAL: 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Stand alone desktops with C compiler 30 Nos. (Or)
Server with C compiler supporting 30 terminals or more.

OUTCOMES:

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

1. Apply basic constructs, arrays, strings, functions and recursion for executing C programming applications. (K3)
2. Analyze C programs involving pointers and structures. (K4)
3. Evaluate applications using sequential and random access files. (K5)

CO-PO, PSO MAPPING:

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

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Sri Sairam Engineering College

SEMESTER - I

24ESID101 - SDG NO. 1-17	IDEA ENGINEERING LAB - I	L	T	P	CP	C
		0	0	2	2	1

OBJECTIVES:

- To understand the significance of Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) of the United Nations
- To familiarize with SDG targets and indicators
- To identify the Constitutional implementation pertaining to SDGs in Panchayat Raj
- To acquire knowledge of the State and the Central government welfare schemes
- To recognize the role of educational Institutions in community development
- To develop critical thinking skills to address complex societal challenges through an immersion program

MODULE - 1 United Nations Sustainability and the Sustainable Development Agenda

3

- Introduction to Sustainability
- Indian Rural Environment: Necessity and Sustainability
- Millennium Development Goals (MDGs)
- United Nations Sustainable Development Goals (SDGs) & the Agenda
- Overview of the Sustainable Development Goals (SDGs)

MODULE - 2 Universal SDG Targets

4

- SDG Framework
- Key Components
- Pillars of the SDGs
- Targets of the Goals
- Indicators of the Targets

MODULE-3 SDG and Indian Gram Panchayat

3

- Gram Panchayat
- Salient Features of Constitutional Amendments
- Transition from SDGs to LSDGs (Localizing Sustainable Development Goals)

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MODULE-4 Government Schemes

4

- Introduction to State and Central Government Schemes
- Overview of Government Schemes
- Localization and Implementation at the Regional Level
- Impact on Local Communities

MODULE-5 Community Engagement

4

- Key Recommendations of the National Education Policy
- Guidelines for Fostering Social Responsibility
- Awareness
- Participation
- Collaboration

MODULE-6 Idea Generation

12

- Immersion Program
- Focus Areas
- Channelizing Ideas
- Forming Working Teams for SDGs (Sustainable Development Goals)

TOTAL: 30 PERIODS**REFERENCES:**

1. Joy Elamon and Ms. Mariamma Sanu George, "The Handbook on Sustainable Development Goals and Gram Panchayats", State Institute for Rural Development (SIRD).
2. Dr.C.R.Rene Robin, Dr.PA.Shanthi , Dr.B.Thanuja & Dr.V.Yuvaraj , "Sairam SDG Idea Engineering Lab I", Sri Sairam Engineering College.

WEB REFERENCES

1. UN Sustainable Development Goals
2. <https://srmuniv.digimat.in/nptel/courses/video/109106200/L30.html>
3. <https://avcce.digimat.in/nptel/courses/video/109106200/L26.html>

OUTCOMES:**Upon completion of the course, the student will be able to:**

1. Analyse and apply the concepts of sustainability, Rural environment, Gram panchayat and various government schemes to design innovative practical solutions that address real life rural challenges. (K2)
2. Compare MDG's, SDG's and LSDG's to analyse village topology and identify specific development targets to propose innovative rural solutions. (K4)

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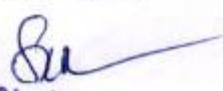
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3. Analyse the attainment levels of SDG's and write a reflective report on local community.(K4)
4. Formulate problem statement based on local community needs and propose innovative ideas for community development. (K4)
5. Perform an individual presentation of field observation by mapping them with relevant SDG's and justify their significance for rural development. (K4)

CO-PO, PSO MAPPING:

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

SEMESTER - I

24ENTP101 - SDG NO.4	FUNCTIONAL LIFE SKILLS	L	T	P	CP	C
		1	0	1	2	1

OBJECTIVES:

- Resolve common communication problems
- Observe the effectiveness of nonverbal messages
- Communicate precisely through the digital media
- Understand the importance of empathetic listening
- Explore reading and speaking processes

MODULE - I LISTENING

5

Techniques of effective listening

Listening and comprehending

Probing questions

Barriers to listening

Reflection from listening

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MODULE - II	SPEECH MECHANICS	5
Pronunciation		
Enunciation		
Vocabulary		
Fluency		
Common errors		
MODULE - III	READING SKILLS	5
Techniques of effective reading		
Kinds of reading		
Gathering ideas and information from the text		
Evaluating the ideas and information		
Interpreting the text from multiple angles		
MODULE - IV	WRITING ASPECTS	5
Writing process		
Effective writing strategies		
Different modes of writing		
Optimizing the use of resources		
Editing		
MODULE - V	PRESENTATION SKILLS	5
Types of presentations		
Nonverbal communication		
Understanding the purpose and the audience		
Beginning and closure of presentations		
Presentation tools and strategies		
MODULE - VI	ARTICULATION ASPECTS	5
Perform exercises		
Slow speeches		
Long speeches		
Monologues, Dialogues and Conversation		
Feedback necessity		
TOTAL : 30 PERIODS		

REFERENCES:

1. Sen, Madhuchanda.2010, An Introduction to Critical Thinking, Delhi, Pearson.

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- Effective Communication Skills Strategies for Success. Edited by Nitin Bhatnager and Mamta Bhatnager. 2023, Pearson
- Technical Communication: Principles and Practice, Meenakshi Raman and Sangeeta Sharma. Oxford University Press, 2015

WEB REFERENCES:

- https://swayam.gov.in/nd1_noc19_hs31/preview
- https://www.myenglishpages.com/speaking/#google_vignette

OUTCOMES:

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

- Employ reading, writing, and listening skills to communicate clearly in academic and professional contexts.
- Demonstrate confident oral communication and presentation skills using appropriate tools and techniques.
- Interpret ethical, inclusive, and culturally aware communication in team and societal settings

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	-	-	-	-	-	-	-	-	3	-	2	-	-
C02	-	-	-	-	-	-	-	-	3	-	2	-	-
C03	-	-	-	-	-	-	-	-	3	2	-	2	-

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SEMESTER - II

24BSMA201 - SDG NO. 4	DISCRETE STRUCTURES	L 3	T 1	P 0	CP 4	C 4
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OBJECTIVES:

- To understand the fundamental concepts of logic, rules of inference, and quantifiers.
- To learn the principles of mathematical induction, permutations, and combinations.
- To gain knowledge of groups and normal subgroups in abstract algebra.
- To develop graph algorithms using the foundational concepts of graph theory.
- To understand the concepts of lattices and Boolean algebra and their applications.

MODULE - I LOGICS
9

Basic Connectives – Truth Tables – Logical Equivalence - The Laws of Logic- Logical Implications - Normal Forms – Rules of Inference – The use of Quantifiers.

MODULE - II COMBINATORICS
9

The Principles of Mathematical Induction – Basic counting techniques – Inclusion and exclusion - Pigeonhole principle - Permutation – Combination.

**MODULE - III ALGEBRAIC STRUCTURES WITH ONE BINARY
OPERATION**
12

Semi Groups- Monoids- Groups - Subgroups – Cosets- Normal subgroups –Lagrange's theorem.

MODULE - IV GRAPHS
12

Graphs - Definition -Special types of Graphs- Matrix representation of Graphs - Graph isomorphism- Path, Cycle, Connectivity - Eulerian and Hamiltonian Graphs.

MODULE - V LATTICES
9

Partial ordering - Posets - Lattices as Posets - Properties of lattices - Lattices as algebraic systems - Sub lattices - Direct product and homomorphism - Some special lattices.

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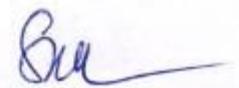
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MODULE - VI BOOLEAN ALGEBRA

9

Boolean Algebra – Definition – Identities of Boolean Algebra -Demorgan's laws.

TOTAL: 60 PERIODS**TEXT BOOKS:**

1. Discrete Mathematics and its Applications: with Combinatorics and Graph Theory, Kenneth H. Rosen, 7th Edition, Tata McGraw –Hill Education Pvt. Ltd., 2015.
2. Discrete Mathematical Structure with Applications to Computer Science", J.P. Tremblay and R. Manohar, Reprint, McGraw-Hill Education (India) Edition 1997.

REFERENCES:

1. Discrete Mathematics with Applications, Susanna S. Epp, 4th edition, Brooks/Cole, Cengage Learning, 2010.
2. Discrete Mathematics, Norman L. Biggs, 2nd Edition, Oxford University Press, 2002.
3. Discrete Mathematics, Seymour Lipschutz, Marc Lipson, Schaum's Outlines Series, 3rd edition, McGraw-Hill Education, 2009.
4. Elements of Discrete Mathematics: A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 4th Edition, Tata McGraw –Hill Education Pvt. Ltd., 2012.

WEB REFERENCES:

1. <https://web.stanford.edu/class/cs103x/cs103x-notes.pdf>
2. <https://www.cs.cornell.edu/~rafael/discmath.pdf>
3. <http://home.iitk.ac.in/~arlal/book/mth202.pdf>
4. https://drive.google.com/file/d/1-PqMULqDim1-AHQK5_zL34I97zHV3W15/view

ONLINE RESOURCES:

1. <https://nptel.ac.in/courses/106106183>
2. <https://www.youtube.com/watch?v=xlUFkMKSB3Y&list=PL0862D1A947252D20>
3. https://www.youtube.com/watch?v=4LITmsfDS4Y&list=PLEAYkSg4uSQ2Wfc_l4QEZUSRdx2ZcFziO&index=13
4. <https://www.youtube.com/watch?v=jBsEKyx6Rj0&list=PLwdnzlV3ogoVxVxCTli45pDVM1aoYoMHf>
5. <https://www.youtube.com/watch?v=rdXw7Ps9vxc&list=PLHXZ90QGMqxersk8fUxiUMSIx0DBqsKZS>

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OUTCOMES:**Upon completion of the course, the student will be able to:**

1. Construct mathematical arguments using logical connectives, quantifiers and verify the correctness of an argument using symbolic logic, truth tables. (K3)
2. Apply counting principle and mathematical induction to solve combinatorial problems. (K3)
3. Explain the fundamental concepts of algebraic structures such as groups and Boolean algebra. (K3)
4. Illustrate the concepts of graphs. (K3)
5. Apply the concepts of Lattices in the field of computer science. (K3)
6. Apply the concepts of Boolean algebra in logical circuits. (K3)

CO-PO, MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	3	2	-	-	-	-	-	-	-	-	-	3	2
C02	3	3	-	-	-	-	-	-	-	-	-	3	2
C03	3	-	-	-	-	-	-	-	-	-	-	3	2
C04	3	2	-	-	-	-	-	-	-	-	-	3	3
C05	3	2	-	-	-	-	-	-	-	-	-	3	3
C06	3	-	3	-	-	-	-	-	-	-	-	3	3

SEMESTER - II

24HSEN201 - SDG NO.4	PROFESSIONAL ENGLISH	L	T	P	CP	C
		2	0	0	2	2

OBJECTIVES:

- Acquire techniques for comprehending and critically analyzing passages
- Improve the communicative competence
- Enhance learners' ability to read and write complex texts, summaries, definitions and reports
- Write effective formal letters and reports
- Develop skills for preparing effective job application

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MODULE - I EFFECTIVE COMMUNICATION

6

Listening – Listening to conversations – Speaking – making conversations in real life occurrences – Reading - short stories, happenings - Writing – autobiographical writing, preparation of checklist – communication and types of communication – Language Development -- subject - verb agreement, commonly confused words – spellings

MODULE - II BASICS OF TECHNICAL WRITING

5

Listening – listening to advertisements and products – Speaking - creating greetings/wishes/excuses and thanks – Reading – articles/novels - Writing - summary of articles, writing modes, formats, compositions - Language Development - reported speech, numerical adjectives

MODULE - III REPORT WRITING

4

Listening – listening to podcasts – Speaking - practicing telephonic conversations – observing and responding. Reading – regular columns of newspapers/magazines - Writing – reports – feasibility, accident, preparation of agenda and minutes – Language Development - cause & effect expressions, discourse markers

MODULE - IV DIVERSE WRITING SKILLS

5

Listening – documentaries, anecdotes and short stories - Speaking – expressing opinions using verbal and non-verbal communication – Reading biographies/autobiographies, travelog, – Writing – formal letters – inviting guests – acceptance/declining letters - Language Development- degrees of comparison – embedded sentences - acronyms and abbreviations

MODULE - V CAREER COMPETENCIES

6

Listening – expert talks – recommending suggestions & solutions – Speaking – Debate- participating in a group discussion – learning GD strategies – Reading – innovations, ideations - Writing – Job application, resume, – proposals – Language Development – verbal analogies – phrasal verbs

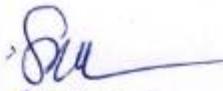
MODULE - VI LEXICAL ENHANCEMENT

4

Listening - technical and general talks - Speaking - oral presentation with visual aids - Reading - successful stories/autobiographies - Writing - writing blogs - Language Development - common errors in English, idiomatic expressions

TOTAL: 30 PERIODS**Recommended by**Board of Studies of HVS dept.Meeting No. 6 Dated: 30/08/2019

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TEXT BOOKS:

1. Board of editors. Fluency in English: A Course book for Engineering and Technology. Orient Blackswan, Hyderabad 2016.
2. Raman, Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford University Press.

REFERENCES:

1. Bailey, Stephen. Academic Writing: A Practical Guide for Students. Routledge, New York, 2011.
2. Raman, Meenakshi, Sharma, Sangeeta. Technical Communication. Principles and Practice. Oxford University Press, New Delhi, 2014.
3. Muralikrishnan & Mishra Sunitha, Communication skills for Engineers 2nd ed. Pearson, Tamil Nadu, India 2011. P. Kiranmai and Rajeevan, Geetha. Basic Communication Skills, Foundation Books, New Delhi, 2013.
4. Vasilind Aarne P., Public Speaking and Writing Skills for Engineering Students (2nd Ed), Lakeshore press, 2007
5. Richards, Jack C. Interchange Students' Book – 2. Cambridge University Press, New Delhi, 2015.

WEB REFERENCES:

1. https://swayam.gov.in/nd1_noc20_hs21/preview
2. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/109106122/lec1.pdf
3. https://takelessons.com/en-in/search?service=English&sort=1&utm_

ONLINE RESOURCES:

1. <https://www.coursera.org/specializations/improve-english?>
2. <https://www.fluentu.com/blog/educator-english/business-english-conversation-topics/>

OUTCOMES:

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

1. Demonstrate an understanding of various types of communication and prepare effective checklists.(K2)
2. Summarize articles/ write ups (K2)
3. Construct feasibility reports, accident reports, survey reports and meeting minutes (K3)
4. Apply skills to compose official letters with emphasis and clarity (K3)

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- Compose job applications and technical proposals (K3)
- Demonstrate the ability to express opinions in both oral and written forms of communication (K2)

CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	3	-	3	-	-
CO2	-	-	-	-	-	-	-	-	3	-	3	-	-
CO3	-	-	-	-	-	-	-	-	3	-	3	-	-
CO4	-	-	-	-	-	-	-	-	3	-	3	-	-
CO5	-	-	-	-	-	-	-	1	3	-	3	-	-
CO6	-	-	-	-	-	-	-	1	3	-	3	-	-

SEMESTER - II

24BSPH203 - SDG NO. 4,7,9	PHYSICS FOR INFORMATION SCIENCE	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To understand the essential principles of physics of conducting materials, superconducting and optical properties of materials
- To educate the basic principles of semiconductor device and electron transport properties
- To become proficient in magnetic materials
- To acquaint the basics of superconducting and optical materials
- To acquire the basic working of nanoelectronic devices
- To understand the basics of quantum computing

MODULE - I CONDUCTING MATERIALS

8

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

MODULE - II SEMICONDUCTOR MATERIALS

7

Direct and indirect band gap semiconductors - Intrinsic Semiconductors -

Carrier concentration in intrinsic semiconductors - Extrinsic semiconductors

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- Carrier concentration in N-type & P-type semiconductors - Variation of carrier concentration with temperature - Variation of Fermi level with temperature and impurity concentration - Carrier transport in Semiconductor: random motion, drift, mobility and diffusion - Hall effect and devices.

MODULE - III MAGNETIC PROPERTIES OF MATERIALS 8

Magnetic dipole moment - atomic magnetic moments - magnetic permeability and susceptibility - Magnetic material classification: diamagnetism - paramagnetism - ferromagnetism - antiferromagnetism - ferrimagnetism - Ferromagnetism: Domain Theory - M versus H behaviour - Hard and soft magnetic materials - applications - Magnetic principle in computer data storage - Magnetic hard disc - GMR sensor.

MODULE - IV SUPERCONDUCTING & OPTICAL PROPERTIES OF MATERIALS 7

Superconductivity - Type-I and Type-II superconductors - Properties and applications - Classification of optical materials - Absorption and emission of light in metals, semiconductors and insulators - Carrier generation and recombination processes - Photo current in a P-N diode - Solar cell - LED - Organic LED - Optical data storage techniques and devices.

MODULE - V NANO DEVICES 8

Introduction - Size dependence of Fermi energy - Quantum confinement - Quantum structures - Density of states in quantum well, quantum wire and quantum dot structure - Band gap of nanomaterials - Tunneling: single electron phenomena and single electron transistor - Quantum dot laser - Carbon nanotubes: Properties and applications.

MODULE - VI QUANTUM COMPUTING 7

Quantum system for information processing - quantum states - classical bits - quantum bits or qubits - multiple qubits - Bloch sphere - Superposition - Entanglement - quantum gates - CNOT gate - Types of Quantum Computer: Quantum Annealer- Analog Quantum- Universal Quantum.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Jasprit Singh, "Semiconductor Devices: Basic Principles", Wiley 2012.
2. Kasap, S.O., "Principles of Electronic Materials and Devices", McGraw- Hill Education, 2017.
3. Kittel, C, "Introduction to Solid State Physics", Wiley, 2018.

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4. S.O.Pillai, "Solid State Physics, New Academic Science", 2017.
5. D.K.Bhattacharya & Poonam Tandon., "Physics for Information Science and Electronics Engineering", Oxford Higher Education", 2017.

REFERENCES:

1. Garcia, N. & Damask, A., "Physics for Computer Science Students", Springer-Verlag, 2012.
2. Hanson, G.W., "Fundamentals of Nanoelectronics", Pearson Education, 2009.
3. Rogers, B., Adams, J. & Pennathur, S., "Nanotechnology: Understanding Small Systems", CRC Press, 2014.

OUTCOMES:

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

1. Explore the basic concepts of free electron theory of solids and apply it to determine the conducting properties, carrier concentration and effective mass of an electron in conductors (K3)
2. Analyze the band structures and carrier concentrations of semiconductors, study their variations with temperature, and examine carrier transport mechanisms (K4)
3. Have an insight into the different types of magnetic materials and magnetic data storage device (K3)
4. Analyze the properties of superconductors and optical interactions in materials and explain the working of optoelectronic and optical storage devices (K4)
5. Examine quantum confinement and quantum structures, analyze the working principles of quantum devices, and explore the applications of carbon nanotubes (K4)
6. Apply the basic concepts of quantum computing to demonstrate the operation of quantum gates and the formation of entangled states (K3)

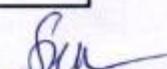
CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-
CO4	-	3	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-
CO6	3	-	-	-	-	-	-	-	-	-	-

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SEMESTER - II

24BSCY201 - SDG NO.4	CHEMISTRY FOR ENVIRONMENT AND SUSTAINABILITY	L T P CP C 3 0 0 3 3
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OBJECTIVES:

- To gain a comprehensive understanding of environmental science, the intricate relationships within ecosystems, and the crucial role of biodiversity conservation..
- To introduce the structure and components of the atmosphere, and provide an overview of the photochemical reactions involved.
- To foster a sound understanding of water quality parameters and water treatment techniques.
- To explore the various components of soil and understand the steps involved in Solid Waste Management (SWM).
- To advocate the benefits of renewable energy and promote awareness of sustainable energy practices..
- To implement the principles of Green Chemistry in alignment with the Sustainable Development Goals (SDGs).

MODULE - I INTRODUCTION TO ENVIRONMENTAL SCIENCE 8

Environment: Definition, concept of environment and its components - scope and importance of environment - need for public awareness.

Ecosystem: Structure and functions: Structures - Biotic and Abiotic components. Functions - Energy flow in ecosystems, food chains and food webs. Biogeochemical cycles(C,N&P), Ecological succession.

Biodiversity and its conservation: Definition, types, importance of biodiversity, values and threats to biodiversity. Endangered and endemic species - concept and basis of identification of 'Hotspots'; hotspots in India. Strategies for biodiversity conservation: in situ, ex situ and in vitro conservation.

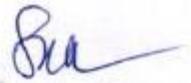
MODULE - II ATMOSPHERIC CHEMISTRY 7

Atmospheric Chemistry - Composition and structure of atmosphere. Climate change - greenhouse effect - role of greenhouse gases (CO₂, CH₄, N₂O, CFCs) on global warming. Chemical and photochemical reactions in the atmosphere - Formation of smog, PAN, acid rain (causes, effect and control measures). Oxygen and ozone chemistry - Ozone layer depletion (causes, effect and control measures).

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MODULE - III WATER CHEMISTRY

8

Importance and scope of water chemistry - Sources and impurities in water - Water Quality Parameters - Specifications as per WHO/BIS standards. Hardness of water, types, numerical problems on hardness of water. Softening of water - Internal treatment (Lime-soda, Phosphate, Calgon, Sodium Aluminate and Colloidal conditioning). External treatments: Ion exchange and Zeolite processes. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water by Reverse osmosis. Sustainable water management practices (water recycling and rainwater harvesting)

MODULE - IV SOIL CHEMISTRY AND SOLID WASTE MANAGEMENT 7

Soil Chemistry: Chemical composition of soil, Acid-Base and Ion-Exchange Reactions in Soil, Soil acidity and salinity. Importance of NPK in Soil Fertility. Modern agriculture - Impacts of both excessive and insufficient fertilizer use, alongside the effects of pesticides on soil chemistry and the environment. Sustainable agriculture - Approaches to improve soil salinity (leaching, soil amendments, crop rotation), Design and use of green pesticides for sustainable farming.

Solid Waste Management System: Sources and types of solid waste, Elements of solid waste management, Methods of residential and commercial waste collection, Treatment / processing - Incineration, Composting, Landfill - Dumpsite rehabilitation.

MODULE - V ENERGY AND ENVIRONMENT 8

Energy sources - Renewable and non-renewable energy sources. Principle and generation of solar energy (solar collectors, photo-voltaic modules, solar ponds), wind energy, geothermal energy; tidal energy, OTEC energy from biomass, biofuels, Nuclear energy - fission and fusion, Nuclear fuels, Nuclear reactor - principles and types. Need for energy efficiency, Energy conservation and sustainability - action strategies for sustainable energy management from a future perspective.

MODULE - VI GREEN CHEMISTRY AND SUSTAINABILITY 7

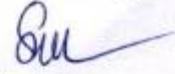
Green Chemistry: Introduction to green chemistry, Principles of Green Chemistry (12-principles), the concept of atom economy and chemical synthesis, Important techniques used in green chemistry. Application of green chemistry, viz. replacement of ozone depleting substances including CFCs, manufacture of biodegradable polymers, use of H₂O₂ as benign bleaching agents in the paper industry.

Sustainable Development: Definition and concepts of sustainable development, Need for sustainable development; Sustainable development

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goals – 17 SDG goals.

Sustainable practices: Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment and Environmental Impact Assessment.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
3. Ravikrishnan A, 'Environmental Science and Engineering', Sri Krishna Hitech Publishing Company Pvt. Ltd, Revised Edition 2020.
4. Vogel's Textbook of Quantitative Chemical Analysis (8th edition, 2014).

REFERENCES:

1. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
2. Erach Bharucha, "Textbook of Environmental Studies", Universities Press(I) PVT, LTD, Hyderabad, 2015.
3. G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014.
4. Chemistry for Environmental Engineering, Clair N. Sawyer, Perry L. McCarty, Gene F. Parkin, 4th Edition, McGraw-Hill.

OUTCOMES:

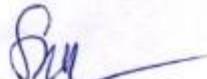
Upon completion of the course, the student will be able to:

1. Develop a foundational understanding of environmental science, the interactions within ecosystems, the significance of biodiversity, and the importance of conservation strategies for maintaining ecological balance. (K3)
2. Identify the primary components of the atmosphere, explain the causes of atmospheric pollution, and propose basic strategies to promote a sustainable and clean atmosphere. (K3)
3. Demonstrate complex water quality parameters, and develop innovative methods for producing cost-effective soft water suitable for both industrial use and potable consumption. (K3)
4. Describe the composition and functions of soil components, analyze the sources and characteristics of solid wastes, and evaluate the methods and strategies employed in solid waste management (SWM). (K3)

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- Explain renewable and non-renewable resources, describe various methods for harnessing energy from different sources and explain their applications in various contexts. (K3)
- Illustrate a comprehensive understanding of green chemistry principles and their alignment with sustainable development goals, preparing them to contribute to environmentally friendly and sustainable practices in their future careers. (K3)

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	2	1	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-
CO4	2	2	1	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-
CO6	3	3	-	2	1	-	-	-	-	-	-

SEMESTER - II

24HSTA201 - SDG NO. 4	TAMILS AND TECHNOLOGY	L 1	T 0	P 0	CP 1	C 1
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OBJECTIVES:

- Understand the techniques that help for a better livelihood
- Identify the methods used for scientific Tamil computing

அலகு-I நெசவு மற்றும் பாணைத் தொழில்நுட்பம்
சங்க காலத்தில் நெசவுத் தொழில் - பாணைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.

UNIT-I WEAVING AND POTTERY (CERAMIC) TECHNOLOGY 5
Weaving Industry during Sangam Age - Ceramic technology - Black and Red-ware Potteries (BRW) - Graffiti on Potteries.

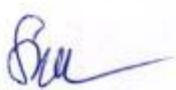
அலகு -II சங்ககாலவாடிவமைப்புகள்

சங்க காலத்தில் வாடிவமைப்பு மற்றும் கட்டுமானங்கள் ரூசங்க காலத்தில் வீட்டுப் பொருட்களில் வாடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள்.

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UNIT-II SANGAM AGE DESIGNS

5

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

அலகு -III பழங்காலகட்டிடத் தொழில்நுட்பம்

மாமல்லபுரச்சிற்பங்களும், கோவில்களும் - சோழர்காலத்துப்பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத்தலங்கள் - நாயக்கர்காலக்கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீணாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டுவீடுகள் - பிரிட்சிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக்கட்டிடக் கலை.

UNIT-III ANCIENT CONSTRUCTION TECHNOLOGY

5

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.

அலகு- IV உற்பத்தித் தொழில்நுட்பம்

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

UNIT-IV MANUFACTURING TECHNOLOGY

5

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

அலகு - V வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக்குழுமித்தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காகவடிவமைக்கப்பட்டகிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.

UNIT-V AGRICULTURE AND IRRIGATION TECHNOLOGY

5

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 - Conch diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

அலகு-VI அறிவியல்தமிழ்மற்றும்கணித்தமிழ்

அறிவியல் துமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை கணித்துப்படுத்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ்

இணையக்கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

UNIT-VI SCIENTIFIC TAMIL & TAMIL COMPUTING

5

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: 30 PERIODS

TEXT-CUM-REFERENCE BOOKS

- தமிழக வரலாறு — மக்களும் பண்பாடும் — கே.கே. பிள்ளை (வெளியீடு தமிழ்நாடு பாடநால் மற்றும் கல்வியில் பணிகள் கழகம்)
- கணினித் தமிழ் — முனைவர் இல.சுந்தரம் (விகடன் பிரசரம்)
- கீழடி — வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
- பொருநை — ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
- Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
- Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
- Historical Heritage of the Tamils (Dr.S.V.Subatamanian> Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
- The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
- Keeladi - „Sangam City Civilization on the banks of river Vaigai... (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation> Tamil Nadu)
- Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
- Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation> Tamil Nadu)
- Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

OUTCOMES:

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

- சங்ககால நெசவு மற்றும் பானைத் தொழில்நுட்பங்களைப் பற்றி அறிந்து கொள்ளுதல்
To learn about the weaving and pottery (ceramic) technologies during the Sangam Age.(K2)
- சங்ககாலவழிவழைப்புகள் மற்றும் கட்டுமானக் கலையைப் புரிந்து கொள்ளுதல்
To understand the designs and structural constructions during the Sangam period.(K2)
- பண்டைய கால கட்டிடக் கலையின்நுட்பங்கள் மற்றும் கட்டிடவழி விகிதங்களை ஆராய்தல்.

Recommended by *[Signature]*

To explore the techniques and architectural patterns of ancient Tamil structures.(K2)

4. உற்பத்தி மற்றும் உலோகவியல்தொழில்நுட்பங்களைப் பற்றி அறிதல்.
To gain knowledge on manufacturing and metallurgical technologies of ancient Tamils.(K3)

5. வேளாண்மை, நீர்ப்பாசனம் மற்றும் கடல்சார்தொழில்நுட்பங்களைப் பற்றி அறிந்து கொள்ளுதல்.
To understand agricultural> irrigation> and marine technologies of ancient Tamil society.(K3)

6. அறிவியல்தமிழ் மற்றும் கணித்தமிழின்வளர்ச்சியையும் அதன் கணினி பயன்பாடுகளையும் புரிந்து கொள்ளுதல்.
To understand the development of Scientific Tamil and its applications in Tamil computing.(K3)

CO-PO, PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	3	3	2	2	-	-	-	-	-	-	1	2	2
C02	3	3	3	2	-	-	-	-	-	-	1	2	1
C03	3	3	3	3	-	-	-	-	-	-	1	2	1
C04	3	2	3	3	-	-	-	-	-	-	1	2	2
C05	3	3	3	3	-	-	-	-	-	-	1	2	1
C06	3	3	3	3	-	-	-	-	-	-	1	2	2

SEMESTER - II

24HSNC201 - SDG NO. 4	NCC COURSE LEVEL 1	L	T	P	CP	C
		2	0	0	2	0

ARMY WING

NCC GENERAL

6

NCC 1 Aims, Objectives & Organization of NCC 1
NCC 2 Incentives 2
NCC 3 Duties of NCC Cadet 1
NCC 4 NCC Camps: Types & Conduct 2

NATIONAL INTEGRATION AND AWARENESS

4

NI 1 National Integration: Importance & Necessity 1
NI 2 Factors Affecting National Integration 1
NI 3 Unity in Diversity & Role of NCC in Nation Building 1

NI 4 Threats to National Security

1

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PERSONALITY DEVELOPMENT	7
PD 1 Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD 2 Communication Skills	3
PD 3 Group Discussion: Stress & Emotions	2
LEADERSHIP	5
L 1 Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2 Case Studies: Shivaji, Jhasi Ki Rani	2
SOCIAL SERVICE AND COMMUNITY DEVELOPMENT	8
SS 1 Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4 Protection of Children and Women Safety	1
SS 5 Road / Rail Travel Safety	1
SS 6 New Initiatives	2
SS 7 Cyber and Mobile Security Awareness	1
TOTAL: 30 PERIODS	

NAVAL WING

NCC GENERAL	6
NCC 1 Aims, Objectives & Organization of NCC	1
NCC 2 Incentives	2
NCC 3 Duties of NCC Cadet	1
NCC 4 NCC Camps: Types & Conduct	2

NATIONAL INTEGRATION AND AWARENESS	4
NI 1 National Integration: Importance & Necessity	1
NI 2 Factors Affecting National Integration	1
NI 3 Unity in Diversity & Role of NCC in Nation Building	1
NI 4 Threats to National Security	1

PERSONALITY DEVELOPMENT	7
PD 1 Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD 2 Communication Skills	3
PD 3 Group Discussion: Stress & Emotions	2

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LEADERSHIP	5
L 1 Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2 Case Studies: Shivaji, Jhasi Ki Rani	2

SOCIAL SERVICE AND COMMUNITY DEVELOPMENT	8
SS 1 Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4 Protection of Children and Women Safety	1
SS 5 Road / Rail Travel Safety	1
SS 6 New Initiatives	2
SS 7 Cyber and Mobile Security Awareness	1

TOTAL: 30 PERIODS

ARMY WING

NCC GENERAL	6
NCC 1 Aims, Objectives & Organization of NCC	1
NCC 2 Incentives	2
NCC 3 Duties of NCC Cadet	1
NCC 4 NCC Camps: Types & Conduct	2
NATIONAL INTEGRATION AND AWARENESS	4
NI 1 National Integration: Importance & Necessity	1
NI 2 Factors Affecting National Integration	1
NI 3 Unity in Diversity & Role of NCC in Nation Building	1
NI 4 Threats to National Security	1

PERSONALITY DEVELOPMENT	7
PD 1 Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving	2
PD 2 Communication Skills	3
PD 3 Group Discussion: Stress & Emotions	2

LEADERSHIP	5
L 1 Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2 Case Studies: Shivaji, Jhasi Ki Rani	2

SOCIAL SERVICE AND COMMUNITY DEVELOPMENT	8
SS 1 Basics, Rural Development Programmes, NGOs, Contribution of Youth	3

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dept.

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SS 4	Protection of Children and Women Safety	1
SS 5	Road / Rail Travel Safety	1
SS 6	New Initiatives	2
SS 7	Cyber and Mobile Security Awareness	1

TOTAL: 30 PERIODS

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Board of Studies of	HSS dept.
Meeting No.	6 Dated: 30/09/2019


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SEMESTER - II

24AIPT201 - SDG NO. 4, 9	PYTHON FOR DATA SCIENCE LABORATORY WITH THEORY	L	T	P	CP	C
		1	0	4	1	3

OBJECTIVES:

- To learn the core programming basics required for Data Science using Python language.
- To develop simple Python programs with conditionals and loops
- To gain knowledge on Data Science modules NumPy, SciPy and Matplotlib

Recommended by

Board of Studies of AI�ps dept.

Meeting No. 8 Dated: 31/9/2019


CHAIRMAN
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 Artificial Intelligence and Data Science

Module - I BASICS OF PYTHON PROGRAMMING 8

Introduction to Python- Features, Identifiers, Reserved words, Indentation, Comments, Built-in Data types and their Methods: Strings, List, Tuples, Dictionary, Set - Type Conversion- Operators. Decision Making- Looping- Loop Control statement- Math and Random number functions. User defined functions - function arguments & its types.

List of Experiments

1. Implement basic Python programs for reading input from console.
2. Perform Creation, indexing, slicing, concatenation and repetition operations on Python built-in data types: Strings, List, Tuples, Dictionary, Set

Module - II FILES, EXCEPTIONS, OOPS CONCEPTS 8

User defined Modules and Packages in Python- Files: File manipulations, File and Directory related methods - Python Exception Handling. OOPs Concepts - Class and Objects, Constructors – Data hiding- Data Abstraction- Inheritance

List of Experiments

1. Create packages and import modules from packages.
2. Write a program to implement OOP concepts like Data hiding and Data Abstraction..

Module - III DATA SCIENCE AND DESCRIPTIVE STATISTICS 8

Need for data science-Benefits and uses- Facets of Data - Data science process- Setting the Research goal-Retrieving Data -Cleansing, integrating and transforming data-Exploratory Data analysis- Data measurement scale- Data descriptive statistics (Measures of central tendency, dispersion/variation, measure of location, Shape and symmetry)-Understanding Python's role in data science.

List of Experiments

1. Write a program to handle numerical operations using math and random number functions
2. Create user-defined functions with different types of function arguments.

Module - IV INTRODUCTION TO NUMPY 7

NumPy Basics: Arrays and Vectorized Computation - The NumPy ndarray- Creating ndarrays - Data Types for ndarrays - Arithmetic with NumPy Arrays - Basic Indexing and Slicing - Boolean Indexing-Transposing Arrays and Swapping Axes.

Universal Functions: Fast Element -Wise Array Functions - Mathematical and

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Statistical Methods-Sorting- Unique and Other Set Logic

List of Experiments

1. Create NumPy arrays from Python Data Structures, Intrinsic NumPy objects and Random Functions.
2. Manipulation of NumPy arrays- Indexing, Slicing, Reshaping, Joining and Splitting.

Module - V DATA MANIPULATION WITH PANDAS

7

Introduction to pandas Data Structures: Series, Data Frame, Essential Functionality: Dropping Entries Indexing, Selection, and Filtering- Function Application and Mapping-Sorting and Ranking. Summarizing and Computing Descriptive Statistics- Unique Values, Value Counts, and Membership. Reading and Writing Data in Text Format.

List of Experiments

1. Create Pandas Series and DataFrame from various inputs.
2. Import any CSV file to Pandas DataFrame and perform the following:
 - a. Visualize the first and last 10 records
 - b. Get the shape, index and column details
 - c. Select/Delete the records (rows)/columns based on conditions.
 - d. Perform ranking and sorting operations.
 - e. Do required statistical operations on the given columns.
 - f. Find the count and uniqueness of the given categorical values.
 - g. Rename single/multiple columns

Module - VI DATA CLEANING, PREPARATION AND VISUALIZATION 7

Data Cleaning and Preparation: Handling Missing Data - Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers- String Manipulation: Vectorized String Functions in pandas. Plotting with pandas: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.

List of Experiments

1. Import any CSV file to Pandas Data Frame and perform the following:
 - a. Handle missing data by detecting and dropping/ filling missing values.
 - b. Transform data using apply () and map() method.
 - c. Detect and filter outliers.
 - d. Perform Vectorized String operations on Pandas Series.
 - e. Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.

TOTAL: 45 PERIODS

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TEXT BOOKS:

1. Y. Daniel Liang, "Introduction to Programming using Python", Pearson, 2nd Edition, 2021.
2. Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly, 2nd Edition, 2018.
3. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly, 2017.
4. Davy Cielen, Arno D.B. Meysman and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016.

REFERENCES:

1. Wesley J. Chun, "Core Python Programming", Prentice Hall, 2006.
2. Mark Lutz, "Learning Python", O'Reilly, 4th Edition, 2009.

WEB REFERENCES:

1. <https://www.edx.org/course/python-basics-for-data-science>
2. <https://www.edx.org/course/analyzing-data-with-python>
3. <https://www.coursera.org/learn/python-plotting?specialization=data-science-python>
4. <https://www.programmer-books.com/introducing-data-science-pdf/>

OUTCOMES:**Upon completion of the course, the student will be able to:**

1. Identify the need for data science and solve basic problems using Python built-in data types and their methods. (K3)
2. Develop an application with user-defined modules and packages using OOP concept (K3)
3. Gain Knowledge on data science fundamentals and process. (K2)
4. Understand data operations using NumPy arrays. (K2)
5. Apply powerful data manipulations using Pandas. (K3)
6. Do data pre-processing and visualization using Pandas. (K3)

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CO-PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	3	2	-	-	3	-	-	-	-	-	1	3	2
C02	3	3	3	-	3	-	-	-	-	-	1	1	1
C03	2	2	-	-	-	-	-	-	-	-	2	2	2
C04	3	2	-	-	3	-	-	-	-	-	1	1	2
C05	3	2	-	2	3	-	-	-	-	-	1	1	1
C06	3	3	2	2	3	-	-	-	-	-	2	1	1

SEMESTER - II

24ESGE102 SDG NO. 4,9,12	ENGINEERING PRACTICES LABORATORY	L	T	P	CP	C
		0	0	4	4	2

OBJECTIVES:

- To provide exposure to the students with hands-on experience on various basic engineering practices in Electrical and Electronics Engineering, Civil and Mechanical Engineering.

ELECTRICAL ENGINEERING PRACTICE

1. Residential house wiring using switches, fuse, indicator, lamp, and energy meter.
2. Fluorescent lamp wiring.
3. Staircase wiring.
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of electrical equipment.

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Board of Studies of MECH dept.Meeting No. 8 Dated: 3/9/24

Digital Content

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ELECTRONICS ENGINEERING PRACTICE

1. Study of Electronic components and equipment – Resistor- colour coding, measurement of AC signal parameter (peak-peak RMS, period, frequency) using CRO.
2. Study of logic gates AND, OR, EX-OR, and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components, Devices, and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of Half Wave Rectifier and Full Wave Rectifier.
6. Simulation of Half Wave Rectifier and Full Wave Rectifier using TinkerCAD.

CIVIL ENGINEERING PRACTICE**Buildings:**

Study of plumbing and carpentry components of residential and industrial buildings, safety aspects.

Plumbing Works:

1. Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
2. Study of pipe connections requirements for pumps and turbines.
3. Preparation of plumbing line sketches for water supply and sewage works.
4. Hands-on-exercise: Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
5. Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

1. Study of the joints in roofs, doors, windows and furniture.
2. Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

MECHANICAL ENGINEERING PRACTICE**Welding:**

1. Preparation of butt joints, lap joints and T-joints by Shielded metal arc welding.
2. Gas welding demo practice.

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Meeting No. 8 Dated: 3/9/20

Basic Machining:

1. Simple Turning and Taper turning.
2. Drilling Practice.

Sheet Metal Work:

1. Forming & Bending.
2. Model making – Trays and funnels.
3. Different type of joints.

Demonstration on:

1. Smithy operations, upsetting, swaging, setting down and bending.
Example – Exercise – Production of hexagonal headed bolt.
2. Foundry operations like mould preparation for gear and step cone pulley.
3. Fitting – Exercises – Preparation of square fitting and V – fitting models.

TOTAL: 60 PERIODS**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS****ELECTRICAL**

1. Assorted electrical components for house wiring 15 Sets
2. Electrical measuring instruments 10 Sets
3. Study purpose items:
 - Iron box, fan and regulator, emergency lamp 1 Each
4. Megger (250V/500V) 1 No
5. Power Tools:
 - Range Finder 2 Nos
 - Digital Live-wire detector 2 Nos

ELECTRONICS

1. Soldering guns 10 Nos
2. Assorted electronic components for making circuits 50 Nos
3. Small PCBs 10 Nos
4. Multimeters 40 Nos

CIVIL

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. 15 Sets
2. Carpentry vice (fitted to work bench). 15 Nos

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3. Standard woodworking tools.	15 Sets
4. Models of industrial trusses, door joints, furniture joints	5 each
5. Power Tools:	
Rotary Hammer	2 Nos
Demolition Hammer	2 Nos
Circular Saw	2 Nos
Planner	2 Nos
Hand Drilling Machine	2 Nos
Jigsaw	2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders	5 Nos
2. Arc welding transformer with cables and holders	5 Nos
3. Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 Sets
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 Nos
5. Centre lathe.	2 Nos
6. Hearth furnace, anvil and smithy tools.	2 Sets
7. Moulding table, foundry tools.	2 Sets
8. Power Tool: Angle Grinder.	2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner.	1 each

OUTCOMES:

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

1. Infer the values of resistance, peak to peak RMS values, time period, frequency. [K2]
2. Outline the logic gates, rectifier, timer circuits and soldering practices. [K2]
3. Demonstrate the measurement of electrical parameters such as voltage, current, resistance, power and energy. (K2)
4. Illustrate the residential wiring, staircase wiring and fluorescent lamp wiring. [K2]
5. Prepare the carpentry and plumbing joints. (K2)
6. Perform the basic operations of welding, sheet metal work and basic machining operations in Lathe and Drilling (K2)

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CO-PO, PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	3	-	-	-	-	-	-	-	-	-	-	2	2
C02	3	-	-	-	-	-	-	-	-	-	-	2	2
C03	3	-	-	-	-	-	-	-	-	-	-	2	2
C04	3	-	-	-	-	-	-	-	-	-	-	2	2
C05	2	-	-	-	-	-	-	-	-	-	-	2	2
C06	2	-	-	-	-	-	-	-	-	-	-	2	2

SEMESTER - II

24ESID201 SDG NO. 1-17	IDEA ENGINEERING LAB - II	L	T	P	CP	C
		0	0	2	2	1

OBJECTIVES:

To impart the basics of technologies that are used to identify sustainable solutions to societal problems

- To Provide awareness on Printed Circuit Board (PCB) design using ORCAD software.
- To Raise awareness of at least three Internet of Things (IoT) projects and their applications.
- To Upskill learners through practical experience with 3D printing and scanning technologies.
- To prepare the learners to correctly align the ideas to SDGs
- To comprehensive knowledge on entrepreneurship and effective idea presentation techniques.
- To evaluate the effectiveness of SDGs and implementation strategy

MODULE-1 BASICS OF DESIGN THINKING IN ELECTRICAL AND ELECTRONIC COMPONENTS

4

- Awareness Session on Basics of Design Thinking
- Study of Active & Passive Electronic Components
- Study of Basic AC & DC Electrical Circuits
- Study of Microprocessors & Microcontrollers
- Demonstration of Arduino Board, ESP 32 Board, Raspberry Pi Board & PCB design software-Eagle
- Demonstration of PCB design using the software's Orcad, Eagle etc.

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MODULE-2 EMBEDDED SYSTEMS, IOT AND ROBOTICS 4

- Study of sensors and transducers
- Study of embedded protocols, IOT Protocols & Embedded C
- Demonstration of Robotics & Drone models

MODULE-3 BASICS OF MECHANICAL ENGINEERING 4

- Study of Mechanical Modeling using Fusion 360
- Demonstration of 3D Scanner, 3D Printer, Laser Cutter & RD Works Software
- Study of Slicer Software & Master Cam Software

MODULE 4 ALIGNMENT AND MAPPING OF IDEAS 4

- **Project Title:** Justification of SDG and SAP - Problem Statement & Solution

MODULE-5 ENTREPRENEURSHIP SKILLS 4

- Startup Awareness
- Entrepreneurship Opportunities
- Mock Presentations
- Innovation
- Novelty
- Feasibility
- Presentation Skills

MODULE-6 SCOUT for SDG IDEATHON 12**Evaluation Stages:**

- First Round
- Second Round
- Idea Pitching

TOTAL: 30 PERIODS**REFERENCES:**

1. D P Kothari and I.J Nagarath, "Basic Electrical and Electronics Engineering", McGraw Hill Education (India) Private Limited, Second Edition, 2020
2. S.K. Bhattacharya, Basic Electrical Engineering, Pearson Education, 2019
3. Elements of Mechanical Engineering by N M Bhatt and J R Mehta, Mahajan Publishing House
4. Basic Mechanical Engineering by Pravin Kumar, Pearson Education

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5. Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", CISCO Press, 2017.
6. R.K.Mittal and I.J.Nagrath, Robotics and Control, Tata McGraw Hill, New Delhi, 4th Reprint, 2017.
7. John J. Craig, Introduction to Robotics Mechanics and Control, Third edition, Pearson Education, 2009.

WEB REFERENCES

1. https://onlinecourses.nptel.ac.in/noc24_ee112/preview
2. https://onlinecourses.nptel.ac.in/noc24_cs115/preview
3. https://onlinecourses.nptel.ac.in/noc24_me104/preview
4. https://onlinecourses.nptel.ac.in/noc24_me88/preview

OUTCOMES:

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

1. Gain the knowledge on Basic Electronics & Electrical Circuits (K2)
2. Understand the Basics of Embedded systems, IOT & Robotics (K1)
3. Explore the the Basics of Mechanical Modeling (K2)
4. Interpret the mapping of SDGs to ideas. (K4)
5. Illustrate the ideas in the Ideathon event emphatically. (K4)

CO-PO, PSO MAPPING:

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

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SEMESTER - II

24ENTP201 - SDG NO. 4	DIGITAL DYNAMICS	L T P CP C 1 0 1 2 0
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OBJECTIVES:

- Explore online communication
- Master computer skills
- Use virtual platforms
- Understand digital ethics and cyber security
- Observe and follow do's and don'ts

MODULE - I DIGITAL CULTURE AND SOCIETY

6

Adapting to changes

Importance in today's digital landscape

Digital identity and self- presentation

Online communities and forums

Digital divide and consequences

Online collaboration and collective action

MODULE - II DIGITAL LITERACY AND ACCESS TO TECHNOLOGY

5

Computer skills

Social and cultural understanding

Social media campaign and Activism

Netiquettes

Trending Technologies

Digital tools and softwares

MODULE - III DIGITAL ETHICS

3

Digital ethics and moral panics

The art of protecting secrets

Overview of digital tools

MODULE - IV CYBER SECURITY

3

Threats, vulnerability and consequences

Data making and usage practice

Importance of security

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MODULE - V DIGITAL NETWORKING

- Remote work and virtual teams
- Authenticity in digital interactions
- Engaging content creation
- Tools and techniques for insightful usage
- Balancing online and offline interactions
- Collaboration for research and innovation

MODULE - VI BUREAU OF INDIAN STANDARDS (BIS): BASIC CONCEPTS, STANDARDS FORMATION PROCESS AND CHALLENGES 6**Standardization -Basic Concepts:**

- Basic concepts of standardization
- Purpose of standardization, marking and certification of articles and processes
- Importance of standards to industry, policy makers, trade, sustainability and innovation

Standards Formulation Process and Challenges:

- Objectives, roles and functions of BIS, Bureau of Indian Standards Act, ISO / IEC Directives
- WTO Good Practices for Standardization

World of Standards:

- Important Indian and International Standards

TOTAL: 30 PERIODS**REFERENCES:**

1. Communication Skills and Soft Skills – an Integrated Approach. Edited by E. Sureshkumar, P. Sreehari and J. Savithri, Pearson.
2. Silvia. P.J. 2007. How to Read a Lot. Washington DC, American Psychological Association.

WEB REFERENCES:

1. https://swayam.gov.in/nd1_noc19_hs31/preview
2. <https://www.sscnasscom.com/ssc-projects/capacity-building-and-development/training/gbfs/>

OUTCOMES:**Upon completion of the course, the student will be able to:**

1. Apply online communication techniques and collaboration skills (K3)

Recommended by *[Signature]* **2. Enumerate the principles of digital ethics in online interactions (K2)**

3. Understand the importance of Bureau of Indian Standards (BIS). (K2)

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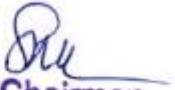
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CO-PO, PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	3	-	2	-	-
CO2	-	-	-	-	-	-	-	-	3	-	2	-	-
CO3	-	-	-	-	-	-	-	-	3	2	-	2	-

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 Meeting No. 6 Dated: 30/09/2014


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- Linear Algebra, Stephen Friedberg, Arnold Insel and Lawrence Spence, 5th Edition, Pearson, 2018..
- Elementary Linear Algebra, Howard Anton and Chris Rorres, 11th Edition, Wiley Publications, 2014 (Units - IV, V & VI).
- Linear Algebra and Learning from Data, Gilbert Strang, 1st Edition, Wellesley-Cambridge Press, 2019

REFERENCES:

- Schaum's Outline on Probability and Statistics, Spiegel M. R., Schiller J. and Srinivasan R. A., 2nd Edition, McGraw-Hill Education, 2000.
- Probability and Statistics for Engineers and Scientists, Walpole R. E., Myers R. H., Myers S. L. and Ye K., 8th Edition, Pearson Education, Asia, 2007.
- Linear Algebra - A Geometric Approach, Kumaresan S., Reprint, Prentice Hall of India, New Delhi, 2010.
- Advanced Engineering Mathematics, Kreyszig E., 8th Edition, John Wiley, 1999.

WEB REFERENCES:

- <https://nptel.ac.in/courses/111105041/>
- <https://www.imsc.res.in/~svi/Algebra/Sunder-LinearAlg-notes.pdf>

ONLINE RESOURCES:

- <https://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/video-lectures/>
- <https://www.khanacademy.org/math/statistics-probability/significance-tests-one-sample/more-significance-testing-videos/v/hypothesis-testing-and-p-values>

COURSE OUTCOMES

Upon completion of the course, the student should be able to:

- Compute measures of central tendency, dispersion, moments, skewness, kurtosis, correlation, regression, and rank correlation for given data sets using appropriate statistical methods. (K3)
- Compute and interpret large sample tests for proportions and means using sampling distributions and hypothesis testing. (K3)
- Apply t-tests, F-test, and Chi-square tests to analyze small sample data for means, variance, independence of attributes, and goodness of fit. (K3)
- Determine the bases and dimension of vector spaces and subspaces. (K3)

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- Calculate matrix representations, null spaces, ranges, eigenvalues, eigenvectors, and determine diagonalizability of linear transformations (K3)
- Apply the Gram-Schmidt orthogonalization process to construct an orthonormal basis from a given set of vectors and solve least squares approximation problems. (K3)

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	3	2	-	-	-	-	-	-	-	-	-	2	2
C02	3	2	-	-	-	-	-	-	-	-	-	2	2
C03	3	2	-	-	-	-	-	-	-	-	-	2	2
C04	3	2	-	-	-	-	-	-	-	-	-	2	-
C05	3	2	-	-	-	-	-	-	-	-	-	3	2
C06	3	2	-	-	-	-	-	-	-	-	-	3	2

SEMESTER - III

24ITPC301 106105225 SDG NO. 4	DATA STRUCTURES AND ALGORITHMS	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To introduce the concepts of Abstract Data Types (ADTs) and provide a thorough understanding of Stacks and Queues
- To develop proficiency in implementing linked list structures
- To impart knowledge on tree data structures
- To familiarize with the fundamentals of graph theory
- To provide foundational skills in algorithm design and analysis

MODULE - I STACKS AND QUEUES
8

Stacks-and-Queues: Abstract-Data-Types-(ADTs): Stack ADT: Operations - Applications - Evaluating arithmetic expressions - Infix, Prefix and Postfix expression - Operations - Queue ADT: Operations - Circular Queue - Priority Queue - Dequeue

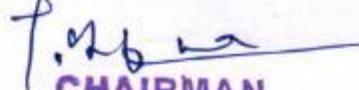
MODULE - II LINKED LIST
7

Linked List: List ADT - Array-Based Implementation - Linked List

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Implementation -- Singly Linked Lists- Circularly Linked Lists- Doubly-Linked Lists – Applications of Lists – All Operations (Insertion, Deletion, Merge, Traversal).

MODULE - III TREES

7

Trees – Tree Traversals - Binary Tree ADT – Expression Trees – Binary Search Tree ADT -Threaded Binary Trees- AVL Trees – B-Tree -Heap

MODULE - IV GRAPHS

8

Graphs: Definition – Representation of Graph – Types of Graph – Breadth First Traversal –Depth First Traversal – Topological Sort – Dijkstra's algorithm – Bellman-Ford algorithm – Floyd's Algorithm - Minimum spanning tree – Prim's and Kruskal's algorithms

MODULE - V SORTING AND SEARCHING ALGORITHMS

8

Bubble sort – Selection sort – Insertion sort - Divide and Conquer – Merge sort – Quick sort – Analysis of sorting algorithm – Linear search - Binary search.

MODULE - VI ALGORITHM ANALYSIS TECHNIQUES

7

Fundamentals of Algorithmic Problem Solving – Fundamentals of the Analysis of Algorithmic Efficiency –Asymptotic Notations and their properties - –Empirical analysis - Mathematical analysis for Recursive and Non-recursive algorithms-Greedy Technique - 0/1 Knapsack problem

TOTAL : 45 PERIODS

TEXT BOOKS:

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education Asia, 2002.
2. AnanyLevitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.
3. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Computer Algorithms/ C++", Second Edition, Universities Press, 2007.

REFERENCES:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.
2. Stephen G. Kochan, "Programming in C", 3rd edition, Pearson Education.
3. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education,1983
4. Yashavant Kanetkar," Data Structures Through C", BPB, ISBN-13:978-9388511391,2019.

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P. 026

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WEB REFERENCES :

1. <https://www.programiz.com/dsa>
2. <http://masterraghul.com/subjects/Datastructures/ebooks/remathareja.pdf>
3. <https://archive.nptel.ac.in/noc/courses/noc18/SEM1/noc18-cs25/>
4. <https://nptel.ac.in/courses/106102064>

OUTCOMES**Upon completion of the course, the student will be able to:**

1. Illustrate the ADT for stack and Queue Data Structures (K3)
2. Demonstrate the ADT for Linked List Data Structures (K3).
3. Interpret the ADT for Tree Data Structures in Real World Problem (K3).
4. Construct Non-Linear for Graph Data Structures (K3).
5. Compare sorting and searching algorithms in terms of time and space complexity.(K4)
6. Analyze greedy algorithms to develop efficient solutions for optimization problems.(K4)

CO - PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	3	2	2	-	2	-	-	-	-	-	-	2	-
C02	3	2	3	-	2	-	-	-	-	-	-	2	2
C03	3	2	3	2	-	-	-	-	-	-	-	2	3
C04	3	2	3	2	-	-	-	-	-	-	-	3	3
C05	3	3	3	2	-	-	-	-	-	-	-	2	2
C06	3	3	3	2	-	-	-	-	-	-	-	3	2

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Meeting No. 8 Dated: 03/9/24

SEMESTER - III

24ESCI301 - SDG NO. 4, 9	BASIC ELECTRONICS AND COMMUNICATION ENGINEERING	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To explore the key ideas and rules of electric circuit laws.
- To understand the working principle of various electronic devices.
- To learn about the key features, internal structure, and typical applications of operational amplifiers.
- To deal with Information theory and channel capacity.
- To acquire knowledge about analog communication.
- To gain knowledge about digital communication techniques.

MODULE - I ELECTRICAL CIRCUIT ANALYSIS

9

Ohm's Law, Kirchhoff's Law-Instantaneous Power- Series and Parallel circuit analysis with Resistive, Capacitive and Inductive network - Nodal analysis, Mesh analysis- Network theorems – Thevenin's theorem, Norton theorem, Maximum power transfer theorem and Superposition theorem.

MODULE - II ELECTRONIC CIRCUITS

7

PN Junction-VI Characteristics of Diode, Zener diode-Breakdown Mechanisms, Zener Diode Applications, Operation of a NPN Transistor, Operation of PNP Transistor, Transistors configurations, Transistor as an amplifier.

MODULE - III OPERATIONAL AMPLIFIER

7

Basic information about Op-amps-Ideal characteristics of Operational Amplifier-General operational amplifier stages-internal circuit diagrams of IC 741- OP-Amp as rectifiers-Basic Op-Amp Applications-Instrumentation Amplifier- V to I Converter, I to V Converter, Differentiator, Integrator, Log and Antilog Amplifier, Comparator.

MODULE - IV INFORMATION THEORY

7

Concept of amount of information, information units- Entropy: marginal, conditional, joint and relative entropies, relation among entropies, Mutual information, information rate, channel capacity.

MODULE - V ANALOG COMMUNICATION

8

Analog Communication-Types of modulation-AM-FM-Phase Modulation – Pulse Modulation – PAM- PWM-PPM-PCM.

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MODULE - VI DIGITAL COMMUNICATION

7

Concepts of Sampling theorem.- Nyquist rate-Digital Modulation Schemes-ASK-FSK- PSK-Concept of Radio wave propagation- Radio signal transmission – Multiple access technique Cellular Wireless Networks.

TOTAL : 45 PERIODS**TEXT BOOKS:**

1. DP Kothari and IJ Nagarath, "Basic Electrical Engineering", McGraw-Hill Education (India) Private Limited, 4th Edition, April 12, 2019.
2. S Salivahanan, N. Suresh Kumar, "Electronic Devices and Circuits", McGraw-Hill Education, 3rd Edition, June 23, 2012.
3. D. Roy Choudhury, Shail B.Jain, " Linear Integrated Circuits", New Age International Pvt.Ltd, 6th Edition, July 2021.
4. Wayne Tomasi, "Advanced Electronic Communication Systems", 6th Edition, Pearson Education, 2009.

REFERENCE BOOKS:

1. Chakrabarti A, "Circuits Theory Analysis and Synthesis", Dhanpath Rai & Sons, New Delhi, Seventh edition, 2023.
2. A Nagoor kani, "Circuit Analysis," McGraw Hill, First edition, 2018
3. Blake, "Electronic Communication Systems", Thomson Delmar Publications, Second edition 2002.
4. Simon Haykin, Communications Systems, 4th Edition Wiley Publications,2006..
5. Sergio Franco,Design with Operational Amplifiers and Analog Integrated Circuits||, 4th Edition, Tata Mc Graw-Hill, 2016.

WEB RESOURCES:

1. <https://www.circuit-magic.com/>
2. <https://www.khanacademy.org/science/electrical-engineering/ee-circuit-analysis-topic>
3. <https://freevideolectures.com/course/2590/introduction-to-communication-theory>
4. <https://www.electronics-tutorials.ws/>
5. <https://www.khanacademy.org/science/electrical-engineering/eeamplifiers>
6. https://www.tutorialspoint.com/linear_integrated_circuits_applications/linear_integrated_circuits_applications_comparators.htm

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ONLINE RESOURCES:

1. <https://nptel.ac.in/courses/117106108>
2. <https://nptel.ac.in/courses/108106181>
3. <https://nptel.ac.in/courses/117105143>
4. <https://nptel.ac.in/courses/108101113>

OUTCOMES**Upon completion of the course, the student will be able to:**

1. Demonstrate the fundamental principles of electric circuit laws and their applications (K3)
2. Utilize the working concepts of various electronic devices (K3).
3. Build the basic applications of operational amplifiers (K3).
4. Apply measures of information such as entropy and mutual information to solve problems in coding theory. (K3)
5. Apply the principles of AM, FM, and PCM modulation schemes to interpret their operation and characteristics (K3).
6. Utilize the principles and characteristics of digital modulation schemes to assess their performance in communication systems (K3).

CO - PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	3	2	2	1	2	1	1	-	1	-	-	1	2
C02	3	2	2	1	2	1	1	-	1	-	-	1	2
C03	3	2	2	1	2	1	1	-	1	-	-	1	2
C04	3	2	2	1	2	1	1	-	1	-	-	1	2
C05	3	2	2	1	2	1	1	-	1	-	-	1	2
C06	3	2	2	1	2	1	1	-	1	-	-	1	2

SEMESTER - III

24CIPC301 - SDG NO. 4, 9	INTRODUCTION TO INTERNET OF THINGS	L	T	P	CP	C
		3	0	0	3	3

OBJECTIVES:

- To understand the fundamentals of microprocessors and microcontrollers.
- To learn about the ARM Cortex M4 microcontroller.
- To gain foundational knowledge of the Internet of Things and its core

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- To explore M2M communication and system management protocols .
- To study IoT system levels and apply Python programming for IoT development.
- To examine IoT implementations in various fields and gain hands-on experience.

MODULE - I MICROPROCESSORS AND MICROCONTROLLERS 9

Introduction to Microprocessors, Study of 8 bit Microprocessor, Block diagram and architecture of 8086 family, pin configuration of 8086. Introduction to 8051 Microcontrollers, pin diagram explanation, internal diagram of 8051- Comparing Microprocessors and Microcontrollers.

MODULE - II EMBEDDED PROCESSOR 8

Introduction to ARM Cortex M4 Microcontroller – Architecture – Registers –Memory Structure

MODULE - III INTRODUCTION TO INTERNET OF THINGS 7

Introduction to IoT-Definition, Characteristics, functional requirements, motivation, Physical design-things in IoT, IoT protocols, Logical Design- functional blocks, communication models, Communication APIs, IoT Enabling Technologies

MODULE - IV M2M AND SYSTEM MANAGEMENT 7

Introduction-M2M, Difference between M2M and IoT, SDN and NFV for IoT, System Management-need, SNMP, NETCONF, YANG.

MODULE - V DEVELOPING INTERNET OF THINGS AND USAGE OF PYTHON 7

IoT levels and deployment -IoT Methodology-Purpose & Requirements specification, process specification, domain model specification, information model specification, service specification, IoT level specifications. IoT systems logical design using python-python data types & data structures, control flow, functions, remote access enablement using cloud, modules & package of python, python packages of interest for IoT.

MODULE - VI IoT APPLICATIONS and CASE STUDY 7

IoT Applications in Home Automation, Cities, Agriculture, Industry. Case study for weather monitoring system-Exemplary device-Raspberry pi, Linux on Raspberry pi, Programming Raspberry Pi

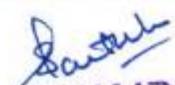
TOTAL : 45 PERIODS

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TEXT BOOKS:

1. Arshdeep Bahga and Vijay Madisetti, Internet of Things A Hand-on Approach, Universities press, 2015
2. Dr. Ovidiu Vermesan and Dr. Peter Friess, Internet of Things: From research and innovation to market deployment, River Publishers, 2014.
3. Honbo Zhou, The Internet of Things in the Cloud: A Middleware Perspective - CRC Press, 2012.
4. Muhammad Ali Mazidi, The 8051 Microcontrollers & Embedded Systems, Second Edition, January 2007

REFERENCE BOOKS:

1. Dieter Uckelmann et.al, Architecting the Internet of Things, Springer, 2011
2. Pethuru Raj and Anupama C.Raman, "The Internet of Things: Enabling Technologies and Use Cases, CRC Press, 2022 by Auerbach Publications
3. Jonathan W. Valvano. "Embedded Systems: Introduction to ARM Cortex-M Microcontrollers". CreateSpace Independent Publishing Platform , 2016.
4. Marilyn Wolf, Computers As Components Principles Of Embedded Computing System Design ,Elsevier Publications Third Edition, 2013.
5. Yu-Cheng Liu (Author), Glenn A. Gibson, Microcomputer Systems: The 8086/8088 Family Architecture Programming and Design Hardcover ,Import, 2nd edition (13 January 1986)

WEB RESOURCES:

1. <https://nevonprojects.com/iot-projects/>
2. <https://www.i-scoop.eu/industry-4-0/>
3. <https://www.coursera.org/courses?query=embedded%20systems>
4. https://www.tutorialspoint.com/embedded_systems/index.htm
5. <https://www.circuitstoday.com/embedded-systems-an-introduction>
6. <https://www.electronicsforu.com/resources/embedded-systems-overview>

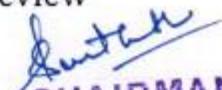
ONLINE RESOURCES:

1. <https://nptel.ac.in/courses/106105166>
2. <https://nptel.ac.in/courses/106105195>
3. <https://nptel.ac.in/courses/108108179>
4. <https://nptel.ac.in/courses/108102045>
5. <https://nptel.ac.in/courses/106105193>
6. https://onlinecourses.swayam2.ac.in/aic20_sp04/preview

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OUTCOMES

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

1. Utilize the architecture and pin configurations of 8086 and 8051 for analyzing and designing microprocessor/microcontroller-based systems (K3).
2. Apply the key components of the ARM Cortex-M4 microcontroller to develop and analyze embedded applications (K3).
3. Develop and assess the functional requirements, architecture, and communication methods used in IoT systems (K3).
4. Utilize the concepts of M2M, IoT, SDN, NFV, and associated system management protocols in practical scenarios (K3).
5. Apply IoT methodology, design specifications, and the use of Python and its packages in IoT development (K3)
6. Develop IoT-based solutions for home automation, smart cities, agriculture, and industry (K3).

CO – PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	3	2	2	1	2	1	1	-	1	-	-	1	2
C02	3	2	2	1	2	1	1	-	1	-	-	1	2
C03	3	2	2	1	2	1	1	-	1	-	-	1	2
C04	3	2	2	1	2	1	1	-	1	-	-	1	2
C05	3	2	2	1	2	1	1	-	1	-	-	1	2
C06	3	2	2	1	2	1	1	-	1	-	-	1	2

SEMESTER - III

24CIPT301 - SDG NO. 4 & 9	DIGITAL DESIGN AND COMPUTER ORGANIZATION SYSTEM LABORATORY WITH THEORY	L	T	P	CP	C
		1	0	4	5	3

OBJECTIVES:

- To introduce basic postulates of Boolean algebra and show the correlation between Boolean expressions.
- To introduce the methods for simplifying Boolean expressions.
- To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits.
- To illustrate the concept of synchronous and asynchronous sequential

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Meeting No. 5 Dated: 17/04/25

- To introduce the concept of memories and programmable logic devices

MODULE - I LOGIC SIMPLIFICATION

7

Review of number systems and number representation – Binary codes – Code Conversion; Logic Simplification: Review of Boolean Algebra and De Morgan's Theorem – SOP and POS forms – Canonical forms – Karnaugh maps up to 4 variables- Implementation using logic gates.

List of Experiments

1. Verification of Boolean Theorems using basic gates
2. Converting Boolean functions to Standard SOP/POS Form using K map realization and Implementation.
3. Implementation of boolean functions using NAND and NOR gate.

MODULE - II COMBINATIONAL LOGIC DESIGN

7

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

List of Experiments

1. Design and implement Half/Full Adder and Subtractor
2. Design and implement combinational circuits using MSI devices:
 - a. 4 bit binary adder/subtractor
 - b. Magnitude comparator

MODULE - III SYNCHRONOUS SEQUENTIAL CIRCUITS

7

Flip - Flops: Bistable elements, Latches, Flip flops – SR, JK, T, D- operation and excitation tables, Triggering of Flip Flop- Master/Slave Flip flop. Registers and Counters: Shift registers - SISO, SIPO, PISO and PIPO; up/down Counters; Design of Synchronous counters - Shift Register Counters.

List of Experiments

1. To design 4 bit synchronous Counter using JK Flip flops - Ic7476
2. To design and Implement- T and D flip flops

MODULE - IV ASYNCHRONOUS SEQUENTIAL CIRCUITS

7

Introduction to asynchronous sequential circuits - fundamental mode and pulse mode circuits - State Diagram and Excitation Table - Ripple Counters cycles and races, state reduction, race free assignments

List of Experiments

1. To design 4-bit Ripple counter using JK Flip flops - Ic7476
2. To design an asynchronous 4-bit up and down counter.

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MODULE - V ARITHMETIC OPERATIONS IN PROCESSORS 5

Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations – Subword Parallelism – one's and two's complement – Booth algorithm

List of Experiments

1. Binary number multiplication using Booth's algorithm
2. Addition and Subtraction Operations in Processors

MODULE - VI MEMORY DEVICES AND PROGRAMMABLE LOGIC DEVICES 5

Memory Devices: Basic memory structure – ROM - PROM – EPROM – EEPROM – EEPROM, RAM – Static and dynamic RAM PLDs: PLA, PAL, PROM, Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using PLA, PAL. – CPLD.

List of Experiments

1. Implementation of adder using PAL and PLA
2. Implementation of Multiplier using PLA and PAL

TOTAL : 45 PERIODS

TEXT BOOKS:

1. M. Morris Mano and Michael D. Ciletti, "Digital Design", Fifth Edition, Pearson, 2014.
2. S. Salivahanan, S. Arivazhagan, "Digital Circuits and Design", Oxford Press India, Fifth Edition, 2018.
3. William Stallings, "Computer Organization and Architecture – Designing for Performance", Eighth Edition, Pearson Education, 2010.

REFERENCE BOOKS

1. CharlesH.Roth. "Fundamentals of Logic Design", 6 Edition, Thomson Learning, 2013.
2. Thomas L. Floyd, "Digital Fundamentals", 10 Edition, Pearson Education Inc, 2011.
3. S.Salivahanan and S.Arivazhagan, "Digital Electronics", 1 Edition, Vikas Publishing House pvt Ltd, 2012
4. A.Anand Kumar, "Fundamentals of Digital Circuits", 4 Edition, PHI Learning Private Limited, 2016.

WEB RESOURCES:

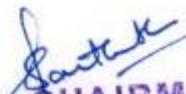
1. <http://nptel.ac.in/courses/117106086/1>
2. <http://nptel.ac.in/courses/117103064/>

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ONLINE RESOURCES:

1. <https://www.allaboutcircuits.com/textbook/digital/>
2. <http://web.iitd.ac.in/~shouri/eel201/lectures.php>

OUTCOMES

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

1. Apply boolean theorem and design combination and sequential circuits. (K3)
2. Analyse Addition and Subtraction Operations in Processors. (K3)
3. Experiment Programmable Logic Devices. (K3)

CO – PO, PSO MAPPING:

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

SEMESTER - III

24HSMC301 - SDG NO. 4, 9	UNIVERSAL HUMAN VALUES – II UNDERSTANDING HARMONY	L	T	P	CP	C
		2	1	0	3	3

OBJECTIVES:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Developing clarity with harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.
- Recognizing the potential of excellence than competition

SYLLABUS:

The course has 28 lectures and 14 practice sessions in 6 modules:

MODULE - I COURSE INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION (5+2)

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I

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Meeting No. 6 Dated: 30/08/2019

2. Self-Exploration-what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly-A critical appraisal of the current scenario

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

MODULE - II UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF

(5+2)

6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.
7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of 'I' and harmony in 'I'
11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

MODULE - III UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY HARMONY IN HUMAN-HUMAN RELATIONSHIP

(6+2)

12. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
13. Understanding the meaning of Trust; Difference between intention and competence
14. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship

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HSS dept

Meeting No.

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15. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

MODULE - IV UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE - WHOLE EXISTENCE AS COEXISTENCE (6+2)

16. Understanding the harmony in the Nature
 17. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self- regulation in nature
 18. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
 19. Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

MODULE - V IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS (4+4)

20. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family
 21. Natural acceptance of human values
 22. Definitiveness of Ethical Human Conduct
 23. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
 24. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people- friendly and eco friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

MODULE - VI UNIVERSAL HUMAN ORDER (4+3)

25. Programs to ensure Sanyam and Health
 26. Case studies of typical holistic technologies, management models and production systems
 27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations

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 Meeting No. 6 Dated: 30/08/2019

28. Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. to discuss the conduct as an engineer or scientist etc

TOTAL : 45 PERIODS

TEXT BOOKS:

1. A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 3rd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.

REFERENCES:

1. AICTE Model Curriculum in Humanities, Social Science and Management Courses (UG Engineering & Technology) Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - JC Kumarappa
8. Bharat Mein Angreji Raj - Pandit Sunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

OUTCOMES

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

1. Express the harmony of relationship among human being, family, society, nature and existence with right understanding and right feeling. (K2)
2. Develop the responsibility of handling problems by finding holistic and sustainable solutions based on the natural acceptance for maintaining mutual human relationships. (K2)
3. Develop a holistic perspective of life based on self-exploration about self, family, society and nature/existence. (K2)
4. Elucidate a critical ability for dedicative commitment towards human values, relationships and society. (K2)

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Meeting No. 6 Dated: 30/07/2019

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5. Implement the process of verification and validation of learning in daily life. (K2)
6. Develop self reflection, commitment and courage to act in life challenging situations. (K2)

CO - PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	3	3	2	-	-	3
CO2	-	1	-	-	-	3	3	2	-	-	-
CO3	-	-	3	-	-	3	3	2	-	-	-
CO4	-	-	-	-	-	3	3	2	-	2	3
CO5	-	-	-	-	-	3	3	-	-	-	3
CO6	-	-	-	-	-	3	3	-	-	3	2

SEMESTER - III

24HSNC301 - SDG NO. 4	NCC COURSE LEVEL 2	L	T	P	CP	C
		3	0	0	3	0

ARMY WING

PERSONALITY DEVELOPMENT

9

PD 3	Group Discussion: Change your mindset, Time Management, Social Skills	6
PD 5	Public Speaking	3

LEADERSHIP

7

L2 Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965 7

DISASTER MANAGEMENT

13

DM 1	Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation	3
DM 2	Initiative Training, Organising Skills, Do's & Don'ts, Natural Disasters, Man Made Disasters	9
DM 3	Fire Service & Fire Fighting	1

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ENVIRONMENTAL AWARENESS & CONSERVATION	3
EA 1 Environmental Awareness and Conservation	3
GENERAL AWARENESS	4
GA 1 General Knowledge	4
ARMED FORCES 6	
AF 1 Armed Forces, Army, CAPF, Police	6
ADVENTURE 1	
AD 1 Introduction to Adventure Activities	1
BORDER & COASTAL AREAS	2
BCA 1 History, Geography & Topography of Border/Coastal areas	2
TOTAL: 45 PERIODS	

NAVAL WING

PERSONALITY DEVELOPMENT	9
PD 3 Group Discussion: Change your mindset, Time Management, Social Skills	6
PD 5 Public Speaking	3

LEADERSHIP 7

L 2 Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965	7
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DISASTER MANAGEMENT	13
DM 1 Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation	3
DM 2 Initiative Training, Organising Skills, Do's & Don'ts, Natural Disasters, Man Made Disasters	9
DM 3 Fire Service & Fire Fighting	1

ENVIRONMENTAL AWARENESS & CONSERVATION	3
EA 1 Environmental Awareness and Conservation	3

GENERAL AWARENESS	4
GA 1 General Knowledge	4

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NAVAL ORIENTATION 6

AF 1	Armed Forces and Navy Capsule	3
EEZ 1	EEZ Maritime Security and ICG	3

ADVENTURE 1

AD 1	Introduction to Adventure Activities	1
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BORDER & COASTAL AREAS

BCA 1	History, Geography & Topography of Border/Coastal areas	2
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TOTAL: 45 PERIODS**AIR FORCE WING****PERSONALITY DEVELOPMENT 9**

PD 3	Group Discussion: Change your mindset, Time Management, Social Skills	6
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PD 5	Public Speaking	3
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LEADERSHIP 7

L 2	Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965	7
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DISASTER MANAGEMENT 13

DM 1	Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation	3
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DM 2	Initiative Training, Organising Skills, Do's & Don'ts, Natural Disasters, Man Made Disasters	9
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DM 3	Fire Service & Fire Fighting	1
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ENVIRONMENTAL AWARENESS & CONSERVATION 3

EA 1	Environmental Awareness and Conservation	3
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GENERAL AWARENESS 4

GA 1	General Knowledge	4
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GENERAL SERVICE KNOWLEDGE 6

GSK 1	Armed Forces & IAF Capsule	2
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GSK 2	Modes of Entry in IAF, Civil Aviation	2
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GSK 3	Aircrafts - Types, Capabilities & Role	2
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Meeting No. 6 Dated: 30/09/2019

ADVENTURE 1

AD 1 Introduction to Adventure Activities 1

BORDER & COASTAL AREAS

2

BCA 1 History, Geography & Topography of Border/Coastal areas 2

TOTAL :45 PERIODS**SEMESTER - III**

24ITPL301 - SDG NO. 4	DATA STRUCTURES AND ALGORITHMS LABORATORY	L	T	P	CP	C
		0	0	4	4	2

OBJECTIVES:

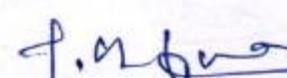
- To implement and demonstrate basic data structures
- To understand and apply algorithmic paradigms
- To apply graph algorithms and optimization techniques
- To develop and analyze efficient searching and sorting techniques
- To implement advanced data structures and algorithms

List of Experiments:

1. Implement the basic operations of a stack using arrays (push, pop, peek, and isEmpty).
2. Implement the basic operations of a queue using arrays (enqueue, dequeue, front, rear, and isEmpty).
3. Implement the conversion of an infix expression to a postfix expression using a stack.
4. Implement a singly linked list with basic operations such as insertion, deletion, and traversal.
5. Implement a doubly linked list with basic operations such as insertion, deletion, and traversal.
6. Implement a binary tree and perform basic operations like insertion, deletion, and traversal (inorder, preorder, postorder).
7. Implementation of AVL tree (all operation).
8. Implementation of Priority queue using Heap.
9. Graph representation and Traversal algorithms a) Depth first Search b) Breadth First Search.
10. Implement Dijkstra's algorithm to find the shortest path from a source vertex to all other vertices in a graph.
11. Implement linear search and Binary search.
12. Implement merge sort and quick sort for Divide and Conquer.

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13. Implement the 0/1 Knapsack Problem using the Greedy technique
 14. Analyze and implement a recursive algorithm (like factorial or Fibonacci)

TOTAL: 45 PERIODS

LAB REQUIREMENTS: Turbo C/Dev C++, Borland C or GCC equivalent

OUTCOMES

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

1. Apply basic linear and non linear data structures. (K3)
2. Analyze and compare various trees, searching and sorting algorithms. (K4)
3. Apply algorithmic strategies such as greedy and graph-based techniques. (K3)

CO - PO, PSO MAPPING:

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PSO1	PSO2
CO1	2	3	3	-	-	-	-	-	-	-	1	3	3
CO2	2	3	3	-	-	-	-	-	-	-	1	3	3
CO3	2	2	3	-	-	-	-	-	-	-	1	3	3

SEMESTER - III

24CPL301 - SDG NO. 4 & 9	IOT AND EMBEDDED SYSTEMS LABORATORY	L	T	P	CP	C
		0	0	4	4	2

OBJECTIVES:

- To learn the fundamentals of Arduino programming and interfacing.
- To understand the Raspberry Pi platform and perform basic hardware interfacing.

LIST OF EXPERIMENTS:

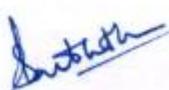
Introduction to Arduino platform and programming

- a) Toggling of LED
- b) Blinking of LED Pattern
- c) LCD Display
- d) Digital I/O configuration.
- e) Timer based LED Toggle.

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- f) On-chip Temperature measurement through ADC.
- g) Echo each character typed on serial terminal
- h) Transmitting a string through UART
- i) IR Sensor
- j) Ultrasonic sensor

Raspberry Pi

- k) Introduction to Raspberry PI platform
- l) Creation of Tables using MSQQL
- m) Blink of LED

TOTAL : 45 PERIODS

OUTCOMES

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

1. Implement digital I/O configurations to interface external components using Arduino (K3).
2. Interface and program peripheral devices such as LCD displays, IR sensors, and ultrasonic sensors with Arduino (K3)
3. Apply UART communication in Arduino to transmit strings and control hardware such as LEDs (K3).
4. Interface sensors like on-chip temperature sensors, IR, and ultrasonic modules with Arduino and acquire data using ADC (K3).
5. Implement serial communication in Arduino to echo characters and transmit strings via terminal (K3).
6. Develop basic applications on Raspberry Pi (K3).

CO - PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	1	2	1	1	-	1	-	-	1	2
CO2	3	2	2	1	2	1	1	-	1	-	-	1	2
CO3	3	2	2	1	2	1	1	-	1	-	-	1	2
CO4	3	2	2	1	2	1	1	-	1	-	-	1	2
CO5	3	2	2	1	2	1	1	-	1	-	-	1	2
CO6	3	2	2	1	2	1	1	-	1	-	-	1	2

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Meeting No. 5 Dated: 17/04/25

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SEMESTER - III

24CITP301 - SDG NO. 4	APTITUDE SKILLS - I	L	T	P	CP	C
		0	0	2	2	1

APTITUDE & COGNITIVE SKILLS – PHASE 1

OBJECTIVES:

- Enrich students on quantitative ability, reasoning ability, and verbal ability
- Build a strong foundation for solving recruitment-based problems with speed and accuracy.
- Enhance creative thinking skills and Strengthen problem-solving skills.

MODULE - I QUANTITATIVE ABILITY 22

Number Properties, Speed Math, HCF and LCM, Percentages, Time and Work, Time Speed and Distance, Ratio Proportion and Variations, Averages Mixtures and Alligation

MODULE - II REASONING ABILITY 16

Profit and Loss, Simple Interest and Compound Interest, Blood Relation, Directions, Coding and Decoding, Series, Ranking and Arrangements

MODULE - III VERBAL ABILITY 7

Subject-Verb Agreement, Tenses, Prepositions - Concepts, Error Spotting, Sentence Correction, Fill in the Blanks

TOTAL: 45 PERIODS

REFERENCES:

1. Quantitative Aptitude for Competitive Examinations – R.S. Aggarwal
2. A Modern Approach to Logical Reasoning – R.S. Aggarwal
3. High School English Grammar & Composition – Wren & Martin
4. Word Power Made Easy – Norman Lewis.
5. Fast Track Objective Arithmetic – Rajesh Verma

LIFE SKILLS, RANGER AND ROVER & BIS STANDARDS – PHASE 2

OBJECTIVES:

- Understand team building and acquire leadership skills.
- Gain Scouting spirit.
- Familiarize with the standards relevant to IOT.

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MODULE - I JEEVAN KAUSHAL 2.0 – TEAM SKILLS AND LIFE SKILLS 14

Trust and Collaboration: Importance of Trust in Creating a Collaborative Team- Agree to Disagree and Disagree to Agree – Spirit of Teamwork - Understanding Fear of Being Judged and Strategies to Overcome.

Brainstorming: Basics and the process – Effective technique for ideation – Types – Importance and Benefits

Internal Communication: Internal Communication – Meaning and the Need, Use of Various Channels for Transmitting Information to Team Members including Digital and Physical.

Leadership Skills: Leadership concept - Leadership skills – Leadership moralities – Leadership models

MODULE - II RANGER AND ROVER 10

Four Bonds of BSG: Sign, Salute, Left Handshake, Moto and Good Turn.

Discipline and Uniform: Uniform of Rovers and Rangers, 14 Programme ideals.

Knowledge of Merit: Know about Knowledge of Merit Badges (Proficiency Badge).

Sustainability E-learning: (Online Course Available in WOSM Learning Zone).

Activating the Earth Tribe Initiative in your Community.

MODULE - III ELECTROMAGNETIC COMPATIBILITY (EMC) AND ELECTROMAGNETIC INTERFERENCE 6

Introduction to the concept of Electromagnetic compatibility of electrical and/or electronic equipment, between themselves and with electrical power networks including electromagnetic interference and measurement and calculation methods to assess human exposure to electric, magnetic and electromagnetic fields. Discussion on IS 14700/ IEC 61000 series of Standards.

TOTAL: 30 PERIODS

REFERENCES:

1. Curriculum and Guidelines for Life Skills (Jeevan Kaushal) 2.0, UGC, New Delhi.
2. A World Built on Standards: A Textbook for Higher Education, Published by: Danish Standards Foundation, 2015.
3. SO / IEC Guide 59, BIS Standards Formulation Manual, 2nd Revision, 2022.

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ONLINE RESOURCES

1. <https://www.cambridgeenglish.org/learning-english>
2. https://lms.scout.org/course_items/show/1172182?course_id=214307#course-item-id=1172182
3. https://lms.scout.org/courses/show/214123?force_course_hub=true

OUTCOMES

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

1. Apply quantitative aptitude for solving numerical problems [K3]
2. Describe logical reasoning to tackle emotional challenges. [K2]
3. Use verbal communication and comprehension skills through grammar and language exercises. [K3]
4. Apply critical thinking and problem-solving skills in various cognitive scenarios. [K3]
5. Interpret language nuances in diversified situations and exhibit scouting spirits amidst communities. [K2]
6. Explain the basic principle of BIS Standards relevant to EMC and EMI. [K2]

CO - PO, PSO MAPPING:

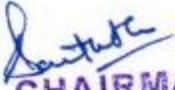
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	2	-	-	-	-	1	-	-
CO3	-	-	-	-	-	-	-	-	2	-	1	-	-
CO4	-	2	-	-	-	-	-	-	-	-	1	-	-
CO5	-	-	-	-	-	-	-	2	3	-	1	-	-
CO6	-	-	-	-	-	3	-	-	-	-	1	-	-

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 Computer Science and Engineering
 (Internet of Things)

SEMESTER - III

24CIID301 - SDG NO. 4,11,15	INNOVATIVE DESIGN LAB - I	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <th>L</th><th>T</th><th>P</th><th>CP</th><th>C</th></tr> <tr> <td>0</td><td>0</td><td>2</td><td>2</td><td>1</td></tr> </table>	L	T	P	CP	C	0	0	2	2	1
L	T	P	CP	C								
0	0	2	2	1								

OBJECTIVES:

- To provide opportunities for students to develop an entrepreneurial mindset and explore real-world problem-solving through a startup-centric approach.
- To enable hands-on experience in identifying market needs
- To enable development of skill sets for designing, validating, and realizing a Minimum Viable Product (MVP) for an entrepreneurial venture.
- To guide students in validating market opportunity, and formulating a solution with realistic constraints.
- To inculcate ethical research practices, foster a commitment to lifelong learning, and promote the development of socially responsible and sustainable innovations aligned with relevant Sustainable Development Goals (SDGs).
- To prepare students to design sustainable business models and present entrepreneurial ideas through structured, outcome-driven business pitches using core startup frameworks.

COURSE METHODOLOGY:

1. This initiative is designed to inculcate ethical principles of research and to get involved in a life-long learning process for the students, specifically through the lens of entrepreneurship and innovation.
2. The project work must involve identifying a problem, validating market opportunity, and developing a solution with realistic constraints, culminating in a business plan and prototype/MVP. It must also include appropriate elements of the following: market research, competitive analysis, value proposition design, business model development, financial feasibility, go-to-market strategy, and potentially software/hardware development for the MVP.
3. Project can be individual work or a group project, with a maximum of 3 students. In case of a group project, the individual project report of each student should specify the individual's contribution to the group project. The roles and responsibilities of all team members must be well-defined and documented.
4. On completion of the project, the student shall submit a detailed project report outlining their entrepreneurial journey, solution development, and business plan. The project should be reviewed and the report shall be evaluated, and the students shall appear for a viva-voce oral examination on the project approved by the Coordinator and the project

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EVALUATION:

1. First evaluation (Milestone 1 - Week 4): 20 marks (Focus on Problem Identification, Opportunity Discovery, Customer & Markets, Value Proposition)
2. Second evaluation (Milestone 2 - Week 8): 30 marks (Focus on Competitive Advantage, Business Model, and MVP Development)
3. Final evaluation (Milestone 3 & 4 - Last week of the semester): 50 marks (Focus on Financial Feasibility, Go-to-Market Strategy, Growth and Scale, Funding Strategy, and Overall Project Report & Viva-Voce)

Note: All three evaluations are mandatory for course completion and for awarding the final grade.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

1. Apply entrepreneurial thinking to identify and articulate real-world problems and explore market needs using structured approaches. (K3)
2. Develop skill sets to design potential solutions and validate market opportunities within realistic constraints. (K4)
3. Evaluate sustainable, ethical, and responsible innovation strategies, and communicate business models effectively. (K5)

CO - PO, PSO MAPPING:

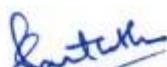
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	-	-	-	2	-	-	-	2	2
CO2	3	3	2	-	-	-	-	2	-	-	-	2	2
CO3	3	3	2	-	-	-	-	2	-	-	-	2	2

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Meeting No. 5 Dated: 17/04/25

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Computer Science and Engineering
(Internet of Things)

SEMESTER - IV

24BSMA402 - SDG NO. 4	PROBABILITY AND QUEUEING THEORY	L	T	P	CP	C
		3	1	0	4	4

OBJECTIVES:

- To impart necessary basic knowledge in Probability theory, Random Processes and Queueing models which are invariably used in Computer science courses

MODULE - I PROBABILITY AND RANDOM VARIABLES 9

Probability - Axioms of probability - Conditional probability - Baye's theorem- Discrete and Continuous random variables - Moments - Moment generating functions.

MODULE - II DISCRETE AND CONTINUOUS DISTRIBUTIONS 9

Binomial, Poisson, Geometric, Uniform, Exponential, Erlang and Normal distributions.

MODULE - III TWO-DIMENSIONAL RANDOM VARIABLES 12

Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and Linear Regression – Transformation of Random Variables – Central Limit Theorem (for independent and identically distributed random variables).

MODULE - IV RANDOM PROCESSES 12

Classification – Stationary process – Markov process - Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations – Limiting distributions.

MODULE - V QUEUEING MODELS 9

Markovian queues – Birth and Death processes – Single and multiple server Queueing models – Little's formula - Queues with finite waiting rooms.

MODULE - VI ADVANCED QUEUEING MODELS 9

Finite source models - M/G/1 queue – Pollaczek-Khinchin formula - M/D/1 and M/EK/1 as special cases – Series queues – Open Jackson networks.

TOTAL: 60 PERIODS

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Meeting No. 6 Dated: 30/08/2019


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TEXT BOOKS:

1. Fundamentals of Applied Probability and Random Processes, Ibe, O. C., 2nd edition, Elsevier, 2019. (1.1, 1.3, 1.6, 1.7 (1.7.1), 1.8, 1.13 - exercise problems in the these sections ; 2.1 – 2.8, 3.1 – 3.5, 3.9, 4.1 - 4.3, 4.4 - 4.4.2, 4.7 – 4.11, 5.1 - 5.7, 6.1 – 6.3, 6.8, 6.10, 8.1 - 8.5, 10.5 (10.5.1 - 10.5.6), 10.6, 10.7 (10.7.1 - 10.7.5)) (Module I, II, III & IV).
2. Fundamentals of Queueing Theory, Gross, D., Shortle, J.F, Thompson, J.M and Harris. C.M., 4th Edition, Wiley Student, 2014. (1.1 – 1.5, 1.7, 2.1 - 2.7, 4.1, 4.2, 5.1 (5.1.1) (Module V & VI).

REFERENCES:

1. Schaum's Outline Theory and Problems of Probability, Random variables and Random Processes, Hwei Hsu, 1st Edition, Tata Mcgraw Hill Edition, New Delhi, 2004.
2. Operations Research, Taha, H. A., 10th Edition, Pearson India Education Services, Delhi, 2019.
3. Probability and Statistics with Reliability, Queueing and Computer Science Applications, Trivedi, K. S., 2nd Edition, John Wiley and Sons, 2002.
4. Probability and Stochastic Processes, Yates, R. D. and Goodman. D. J., 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2012.
5. Probability and Statistics, Random Processes and Queueing Theory, Veerarajan T., 4th Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2015.

WEB REFERENCES:

1. <https://nptel.ac.in/courses/117103017/>
2. <https://archive.nptel.ac.in/courses/111/102/111102111/>
3. Lecture Notes | Probability and Random Variables | Mathematics | MIT OpenCourseWare
4. <https://deposit.ub.edu/dspace/bitstream/2445/127366/3/memoria.pdf>

ONLINE RESOURCES:

1. <https://nptel.ac.in/courses/111105041/>
2. <https://archive.nptel.ac.in/courses/111/102/111102111/>
3. <https://archive.nptel.ac.in/courses/111/104/111104079/>
4. <https://archive.nptel.ac.in/courses/111/102/111102160/>

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 Meeting No. 6 Dated: 30/09/2024

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 Department of Humanities & Sciences

COURSE OUTCOMES**Upon completion of the course, the student should be able to:**

1. Apply probability concepts, random variables, and moment-generating functions to solve engineering problems involving uncertainty. (K3)
2. Apply discrete and continuous probability distributions to model and solve engineering problems involving random phenomena. (K3)
3. Apply joint, marginal, and conditional distributions along with correlation and regression concepts to analyze relationships between two random variables in engineering problems. (K4)
4. Apply concepts of random processes, including Markov and Poisson processes, to model and analyze stochastic systems evolving over time. (K4)
5. Apply Markovian queueing models and related concepts to analyze and solve problems involving service systems with waiting lines. (K4)
6. Apply advanced queueing models and network theories to analyze complex service systems and their performance. (K4)

CO - PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	3	-	-	-	-	-	-	-	-	-	-	2	-
C02	3	-	-	-	-	-	-	-	-	-	-	2	-
C03	-	3	-	-	-	-	-	-	-	-	-	2	-
C04	-	3	-	-	-	-	-	-	-	-	-	3	2
C05	-	3	-	-	-	-	-	-	-	-	-	3	2
C06	-	3	-	-	-	-	-	-	-	-	-	3	2

SEMESTER - IV

24SCPT401 noc21_cs88 SDG NO. 4, 9, 16	OPERATING SYSTEM IN KALI LINUX LAB WITH THEORY	L	T	P	CP	C
		1	0	4	5	3

OBJECTIVES:

- Understand the foundational knowledge of operating system concepts with a focus on security.
- Develop hands-on expertise in using Kali Linux for OS-level operations and security testing.

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- Equip students to apply process, memory, and file management techniques in practical scenarios.
- Enable students to conduct network monitoring and security assessments using Kali tools.
- Prepare students for advanced use cases like penetration testing and incident response.
- To Understand the Penetration Testing workflow tools like Metasploit, Wireshark, and Burp Suite

MODULE - I INTRODUCTION TO OPERATING SYSTEMS AND KALI LINUX

6

Operating System Overview: Functions and Types -Key OS Concepts: Processes, Threads, Scheduling, and Memory Management- Introduction to Kali Linux: History, Installation, and Key Features-Use Cases of Kali Linux for Penetration Testing

Lab Exercises:

1. Install and configure Kali Linux on VirtualBox or Bare Metal
2. Basic Command-Line Operations in Kali Linux

MODULE - II PROCESS MANAGEMENT AND SCHEDULING IN KALI LINUX

8

Process Lifecycle: Creation, Execution, Termination- Scheduling Algorithms: First Come First Serve (FCFS), Shortest Job Next (SJN), Round Robin (RR)- Managing Processes in Kali Linux using Commands - Multi-tasking and Multi-threading in Kali Linux

Lab Exercises:

1. Using ps, top, kill, nice, and renice commands
2. Create and Manage Background Processes in Kali Linux

MODULE - III MEMORY MANAGEMENT AND FILE SYSTEMS IN KALI LINUX

8

Memory Allocation Techniques: Paging and Segmentation- Virtual Memory and Swapping in Kali Linux- File Systems: EXT, NTFS, FAT32 Overview - File Permissions and Management in Kali Linux

Lab Exercises:

1. Configure and Monitor Memory Usage
2. Use Commands like chmod, chown, and lsattr to Manage File Permissions
3. Mount and Unmount Drives and File Systems

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MODULE - IV NETWORKING AND SECURITY FEATURES IN KALI LINUX 8

Basic Networking Concepts: TCP/IP Stack, Ports, and Protocols- Networking Tools in Kali Linux: nmap, netstat, ping- Security Essentials: Firewalls, SELinux, and IP Tables -Managing Network Interfaces in Kali Linux

Lab Exercises:

1. Perform Network Scanning with nmap
2. Monitor Network Traffic using tcpdump and wireshark
3. Configure and Test Firewall Rules with iptables

MODULE - V USER MANAGEMENT AND SCRIPTING IN KALI LINUX 7

Managing Users and Groups in Kali Linux- User Authentication and Password Management- Shell Scripting for Automation in Kali Linux- Automating Security Tasks using Scripts

Lab Exercises:

1. Create and Manage Users and Groups using useradd, usermod, and passwd
2. Write Shell Scripts for Automated Backup or Network Monitoring

MODULE - VI ADVANCED TOPICS AND USE CASES 8

Penetration Testing Workflow in Kali Linux- Advanced Tools in Kali Linux: Metasploit, Wireshark, and Burp Suite- Best Practices for Security and Incident Response-Future Trends in Operating Systems and Cyber Security

Lab Exercises:

1. Conduct a Penetration Testing Simulation with Metasploit
2. Capture and Analyze Packets with Wireshark
3. Perform Vulnerability Scanning using Kali Tools

TOTAL : 45 PERIODS

TEXT BOOKS:

1. "Operating System Concepts" by Abraham Silberschatz, Peter B. Galvin, Greg Gagne (10th Edition, 2018).
2. "Kali Linux Revealed" by Raphael Hertzog, Jim O'Gorman, and Mati Aharoni (2017).

REFERENCE BOOKS:

1. "Modern Operating Systems" by Andrew S. Tanenbaum and Herbert Bos (4th Edition, 2015).
2. "The Linux Command Line: A Complete Introduction" by William E. Shotts (2nd Edition, 2019).

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Meeting No. 1 Dated: 21/4/25

21/4/25
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 Department of Computer
 Science and Engineering (Cyber Security)

NPTEL Courses:

1. Operating System
2. Cyber Security

OUTCOMES**Upon completion of the course, the student will be able to:**

1. Apply the core operating system concepts and their applications in Kali Linux. (K3)
2. Implement process management and scheduling algorithms. (K3)
3. Explain the process, memory, and file management mechanisms in Kali Linux.(K3)

CO - PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	2	-	-	-	-	-	-	3	3
CO2	3	2	2	-	3	-	-	-	-	-	-	2	3
CO3	3	3	3	2	3	-	-	-	-	-	-	3	3

SEMESTER - IV

24CSPC401 106104028 SDG NO. 4	THEORETICAL COMPUTER SCIENCE	L	T	P	CP	C
		3	0	0	3	3

MODULE - I AUTOMATA FUNDAMENTALS & FINITE AUTOMATA 7

Introduction to formal proof - Inductive Proofs-Finite Automata - Deterministic Finite Automata - Non- deterministic Finite Automata -Finite Automata with Epsilon Transitions-Equivalence and Minimization of Automata -Table Filling Algorithm.

MODULE - II REGULAR EXPRESSIONS & CONTEXT FREE GRAMMAR 8

Regular Expressions-FA and Regular Expressions-State Elimination Method-CFG -Parse Trees -Ambiguity in Grammars and Languages – Normal Forms for CFG.

MODULE - III PUSHDOWN AUTOMATA & TURNING MACHINE 8

Definition of the Pushdown Automata -Equivalence of Pushdown Automata and CFG - Deterministic Pushdown Automata - Turing Machines - Programming Techniques for Turing Machine - Non Recursive Enumerable (RE) Language - Undecidable Problem with RE.

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MODULE - IV INTRODUCTION TO COMPILERS & LEXICAL ANALYSIS 7

Compilation and Interpretation-Phases of a compiler -Lexical Analysis – Role of Lexical Analyzer- Recognition of Tokens – LEX tool.

MODULE - V SYNTAX ANALYSIS 7

Role of the parser- Top Down parsing – Recursive Descent Parsing – Predictive LL(1) Parsing – Bottom-up parsing – Shift Reduce Parsing – LR Parsers – SLR Parser – LALR -Error Handling and Recovery in Syntax Analyzer-YACC.

MODULE - VI CODE GENERATION & CODE OPTIMIZATION 8

Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – BackPatching – Procedure calls.-Issues in the design of code generator – The target machine - Basic Blocks and Flow Graphs - DAG Representation of Basic Blocks.- Principal Sources of Optimization – Peep-hole optimization - DAG Optimization of Basic Blocks

TOTAL : 45 PERIODS

TEXT BOOKS:

1. J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2011.
2. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, "Compilers: Principles, Techniques and Tools", Second Edition, Pearson Education, 2009.

REFERENCES:

1. H.R.Lewis and C.H.Papadimitriou, "Elements of the theory of Computation", Second Edition, PHI, 2010.
2. J.Martin, "Introduction to Languages and the Theory of Computation", 4th Edition, TMH, 2019.
3. Micheal Sipser, "Introduction of the Theory and Computation", 4th Edition, Thomson Brokecole, 2014.
4. V. Raghavan, "Principles of Compiler Design", Tata McGraw Hill Education Publishers, 2010.
5. Randy Allen, Ken Kennedy, "Optimizing Compilers for Modern Architectures: A Dependence based Approach", Morgan Kaufmann Publishers, 2002.

WEB REFERENCES:

1. <https://nptel.ac.in/courses/106/104/106104148>

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2. https://swayam.gov.in/nd1_noc19_cs79/
3. <http://www.holub.com/software/compiler.design.in.c.docs.pdf>
4. <http://www.cs.usfca.edu/~galles/compilerdesign/x86.pdf>

ONLINE RESOURCES:

1. <http://www.youtube.com/watch?v=eqCkkC9A0Q4>
2. <https://online.stanford.edu/courses/soe-ycsautomata-automata-theory>
3. <https://www.javatpoint.com/compiler-tutorial>

OUTCOMES

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

1. Determine the models of computation and construct automata (K3)
2. Construct Regular Expression for any pattern and develop Context Free Grammar for any given language (K6)
3. Develop and understand the language of PushDown Automata and Turing machine (K6)
4. Interpret the role of each phase of a compiler and Lexical Analyzer (K5)
5. Construct parsers like top-down, bottom-up for a given grammar (K6)
6. Develop semantic analyzer, code generation and code optimization to get the optimized code (K6)

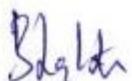
CO - PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	3	3	2	2	-	-	-	-	-	-	-	2	2
C02	3	3	3	2	-	-	-	-	-	-	-	2	2
C03	3	3	3	3	-	-	-	-	-	-	-	2	2
C04	3	3	3	3	-	-	-	-	-	-	-	2	2
C05	3	3	3	3	-	-	-	-	-	-	-	2	2
C06	3	3	3	3	-	-	-	-	-	-	-	2	2

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Sri Sairam Engineering College

SEMESTER - IV

24ITPW301 106106220 SDG NO. 4 & 9	DATABASE MANAGEMENT SYSTEMS WITH LABORATORY	L 3	T 0	P 2	CP 5	C 4
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OBJECTIVES:

- To design database and database queries using ER diagrams and SQL respectively
- To understand Dependencies and various types of normalization in database application
- To understand the concepts of concurrent Transaction Processing and recovery procedures
- To understand the cursor, procedure and control structure in PL/SQL
- To obtain knowledge about the Distributed, Object Databases ,XML and NOSQL databases

MODULE - I DATABASE DESIGN AND RELATIONAL DATABASES 8

Purpose of Database System-Views of Data-Database System Architecture- Data Models-Entity Relationship Model-ER Diagrams-Enhanced ER Model- Introduction to Relational Databases – Relational Model-ER-to-Relational Mapping- Keys-Relational Algebra – SQL Fundamentals

MODULE - II FUNCTIONAL DEPENDENCIES AND NORMALIZATION 7

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

MODULE - III PL/SQL PROGRAMMING 9

Introduction of PL/SQL -Advantages of PL/SQL- PL/SQL Block Structure, PL/SQL Data Types, Variable, Constant- Control Structure- Conditional Control, Iterative Control, Sequential Control- Exception handling Predefined Exception, User defined Exception-Cursors- Implicit and Explicit Cursors, Declaring, opening and closing cursor, fetching a record from cursor ,cursor for loops, parameterized cursors- Procedures- Advantages, Create, Execute and Delete a Stored Procedure.

MODULE - IV CONCURRENT TRANSACTION PROCESSING 7

Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control-Need for Concurrency-Locking Protocols-Two Phase

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Meeting No. 8 Dated: 3/9/24

Locking-Deadlock-Transaction Recovery-Save Points-Isolation Levels- SQL Facilities for Concurrency and Recovery.

MODULE - V FILE ORGANIZATION AND QUERY PROCESSING 7

RAID - File Organization - Organization of Records in Files - Indexing and Hashing -Ordered Indices - B+ Tree Index Files - B Tree Index Files - Static Hashing - Dynamic Hashing - Query Processing Overview - Algorithms for SELECT and JOIN operations - Query optimization using Heuristics - Cost Estimation.

MODULE - VI OBJECT ORIENTED DATABASE, XML DATABASE AND NOSQL 7

Distributed Databases-Architecture-Data Storage-Transaction Processing-Object Based Databases - Object Database Concepts - Object Relational Features - ODMG Object Model - ODL - OQL - XML Databases - XML Hierarchical Model-DTD-XML Schema-Xquery. Introduction to NoSQL-Four types of NoSQL database

LIST OF EXPERIMENTS 15

1. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements.
2. Database Querying-Simple queries, Nested queries, Sub queries and Joins.
3. Implementation of Views, Sequences and Synonyms.
4. Implicit and Explicit Cursors
5. Procedures and Functions.
6. Triggers.
7. Exception Handling
8. Develop any one application using the following steps
 - i) Database Design using ER Model
 - ii) Normalization
 - iii) Front End and Back End Design and connectivity

TOTAL : 60 PERIODS

TEXT BOOKS:

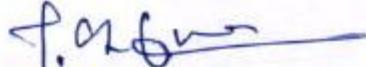
1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Seventh Edition, Tata McGraw Hill, 2020.
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2016.

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REFERENCES:

1. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
2. Raghu Ramakrishnan, "Database Management Systems", Fourth Edition, McGraw-Hill Education, 2015.
3. G.K.Gupta, "Database Management Systems", Tata McGrawHill, 2011.

WEB REFERENCES:

1. https://swayam.gov.in/nd1_noc19_cs46/
2. <http://www.nptelvideos.in/2012/11/database-management-system.html>
3. <https://www.classcentral.com/course/swayam-database-management-system-9914>
4. <http://learnsql.com>
5. <https://www.w3schools.com/sql/default.asp>
6. <https://www.khanacademy.org/computing/computer-programming/sql>

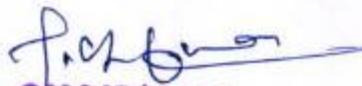
OUTCOMES**Upon completion of the course, the student will be able to:**

1. Sketch the principles of Relational databases to design the Entity relationship diagrams for any given scenario. (K3)
2. Demonstrate the use of normalization and functional dependencies to refine the database system. (K4)
3. Implement basic control structures, Exceptions, Cursors, Procedures in PL/SQL. (K3)
4. Examine various SQL queries for Transaction Processing and Locking using the concept of Concurrency control. (K3)
5. Demonstrate indexing and hashing techniques for the organization of databases and to perform advanced query processing. (K5)
6. Examine the various types of modern and traditional databases (K4)

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CO - PO, PSO MAPPING:

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CO1	2	2	2	-	-	-	-	-	-	-	-	2	2
CO2	2	2	2	-	-	-	-	-	-	-	-	2	2
CO3	2	2	2	-	-	-	-	-	-	-	-	2	2
CO4	2	2	2	-	-	-	-	-	-	-	-	2	2
CO5	2	2	2	-	-	-	-	-	-	-	-	2	2
CO6	2	2	2	-	-	-	-	-	-	-	-	2	2

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Board of Studies of _____ dept.
Meeting No. _____ Dated: _____

SEMESTER - IV

24HSNC401 - SDG NO. 4	NCC COURSE LEVEL 3	L	T	P	CP	C
		3	0	0	3	0

ARMY WING**PERSONALITY DEVELOPMENT**

9

PD 3 Group Discussion: Team Work 2
 PD 4 Career Counselling, SSB Procedure & Interview Skills 3
 PD 5 Public Speaking 4

BORDER & COASTAL AREAS

4

BCA 2 Security Setup and Border/Coastal management in the area 2
 BCA 3 Security Challenges & Role of cadets in Border management 2

ARMED FORCES 3

AF 2 Modes of Entry to Army, CAPF, Police 3

COMMUNICATION

3

C 1 Introduction to Communication & Latest Trends 3

INFANTRY

3

INF 1 Organisation of Infantry Battalion & its weapons 3

Recommended by

Board of Studies of HAS dept.
Meeting No. 6 Dated: 30/09/2024

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 Department of Humanities & Sciences

MILITARY HISTORY	23
MH 1 Biographies of Renowned Generals	4
MH 2 War Heroes - PVC Awardees	4
MH 3 Study of Battles - Indo Pak War 1965, 1971 & Kargil	9
MH 4 War Movies	6
TOTAL: 45 PERIODS	
NAVAL WING	
PERSONALITY DEVELOPMENT	9
PD 3 Group Discussion: Change your mindset, Time Management, Social Skills	6
PD 5 Public Speaking	3
LEADERSHIP 7	
L 2 Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965	7
DISASTER MANAGEMENT	13
DM 1 Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation	3
DM 2 Initiative Training, Organising Skills, Do's & Don'ts, Natural Disasters, Man Made Disasters	9
DM 3 Fire Service & Fire Fighting	1
ENVIRONMENTAL AWARENESS & CONSERVATION	3
EA 1 Environmental Awareness and Conservation	3
GENERAL AWARENESS	4
GA 1 General Knowledge	4
NAVAL ORIENTATION 6	
AF 1 Armed Forces and Navy Capsule	3
EEZ 1 EEZ Maritime Security and ICG	3
ADVENTURE 1	
AD 1 Introduction to Adventure Activities	1
BORDER & COASTAL AREAS	2
BCA 1 History, Geography & Topography of Border/Coastal areas	2
TOTAL: 45 PERIODS	

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Meeting No. 6 Dated: 30/09/2019

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TOTAL: 45 PERIODS



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Department of Humanities & Sciences

AIR FORCE WING

PERSONALITY DEVELOPMENT	9
PD 3 Group Discussion: Team Work	2
PD 4 Career Counselling, SSB Procedure & Interview Skills	3
PD 5 Public Speaking	4

BORDER & COASTAL AREAS

BCA 2 Security Setup and Border/Coastal management in the area	2
BCA 3 Security Challenges & Role of cadets in Border management	2

AIRMANSHIP

A 1 Airmanship	1
---------------------	---

BASIC FLIGHT INSTRUMENTS

FI 1 Basic Flight Instruments	3
------------------------------------	---

AERO MODELLING

AM 1 Aero Modelling Capsule	3
----------------------------------	---

GENERAL SERVICE KNOWLEDGE

GSK 4 Latest Trends & Acquisitions	2
---	---

AIR CAMPAIGNS

AC 1 Air Campaigns	6
-------------------------	---

PRINCIPLES OF FLIGHT

PF 1 Principles of Flight	3
--------------------------------	---

PF 2 Forces acting on Aircraft	3
-------------------------------------	---

NAVIGATION

NM 1 Navigation	2
----------------------	---

NM 2 Introduction to Met and Atmosphere	3
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TOTAL :45 PERIODS

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Board of Studies of HKS dept.
 Meeting No. 6 Dated: 30/08/2019

SEMESTER - IV

24CSPT401 - SDG NO. 4 & 9	OBJECT ORIENTED PROGRAMMING LABORATORY WITH THEORY	L	T	P	CP	C
		1	0	4	5	3

MODULE - I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 9

Object Oriented Programming – Abstraction – Objects and Classes –Encapsulation- Inheritance – Polymorphism- Characteristics of Java – The Java Environment – Java Source File – Compilation – Fundamental Programming Structures in Java – Defining Classes in Java – Constructors Methods -Access Specifiers- Static Members – Comments - Data Types –Variables – Operators - Control Flow - Arrays - Packages - Javadoc Comment

LIST OF EXPERIMENTS

1. Write a program to find the sum of individual digits of a positive integer.
2. Write a program to generate the first n terms of the sequence.
3. Write a program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
4. Write a program to find both the largest and smallest number in a list of integers.
5. Write a Java program to implement a package for currency, distance and time converter.

MODULE - II INHERITANCE AND INTERFACES

8

Inheritance – Superclasses- Subclasses –Protected Members – Constructors in SubClasses- The Object Class – Abstract Classes and Methods- FinalMethods and Classes – Interfaces – Defining an Interface – ImplementingInterface - Differences Between Classes and Interfaces - Extending interfaces –Object Cloning - Inner Classes - Strings.

LIST OF EXPERIMENTS

1. Write a Java program that creates a class hierarchy for employees of a company. The base class should be Employee, with subclasses Manager, Developer, and Programmer. Each subclass should have properties such as name, address, salary, and job title. Implement methods for calculating bonuses, generating performance reports, and managing projects.
2. 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. Use interfaceConcept.

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Department of Computer Science and Engineering

Sri Sairam Engineering College

3. Write a Java program to perform the following operations.
 - a. Find the string index.
 - b. Compare two strings.
 - c. Retrieve the single character from sting.
 - d. Find the substring of the given string.
 - e. Split the string.

MODULE - III EXCEPTION HANDLING AND I/O

7

Exceptions – Exception Hierarchy – Throwing and Catching Exceptions – BuiltIn Exceptions - Creating Own Exceptions - Stack Trace Elements - Input /Output Basics – Streams – Byte Streams and Character Streams – Reading and Writing Console – Reading and Writing Files.

LIST OF EXPERIMENTS

1. Create a Custom Exception for Invalid Age Input in a Voting System.
2. Design a Java interface for ADT Stack. Implement this interface using an array. Provide necessary exception handling in both the implementations.
3. Write a Java Program that opens a file using FileReader and handles FileNotFoundException and IOException.
4. Write a Java program that reads the contents of a text file named input.txt and creates a new file named output.txt that contains the same contents in uppercase letters.
5. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.

MODULE - IV MULTI-THREADING AND GENERIC PROGRAMMING

7

Differences between Multithreading and Multitasking - Thread Life Cycle - Creating Threads - Synchronizing Threads - Inter-Thread Communication - Daemon Threads - Thread Groups - Java Concurrency Packages - Generic Programming – Generic Classes – Generic Methods – Bounded Types – Restrictions and Limitations.

LIST OF EXPERIMENTS

1. Write a Java Program to calculate the sum of the array using Multithreading.
2. Write a Java program to create a producer-consumer scenario using the wait() and notify() methods for thread synchronization.
3. Write a Java Program to implement to create multiple threads which prints the message alternatively.
4. Write a Java Program to create a generic method that takes a list of any type and returns it as a new list with the elements in reverse order.

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5. Write a Java Program using Generic Classes to count the number of occurrences of the element in a list.

MODULE - V GUI PROGRAMMING WITH SWINGS

7

Swing – JFrame, JLabel, JButton, JPanel – Handling Events – ActionListener – Layouts – Swing Components - JTextField, JCheckBox, JRadioButton, JComboBox – Menu and Menubar – Dialog Box – Model – View Controller (MVC) – File Handling – Creating applications.

LIST OF EXPERIMENTS

1. Create a simple GUI that changes the background color of a panel based on button clicks using Swing components.
2. Write a Java Program to build a Calculator in Swings
3. Write a Java program to design student registration form using Swing controls.
4. Write a Java Program to display Digital Watch using Swings.
5. Write a Java Program using Swings to develop a simple inventory management system that allows users to add, remove, and update inventory items.

MODULE - VI LAMBDA EXPRESSIONS AND REACTIVE PROGRAMMING 7

Lambda expressions – Library Enhancements to Support Lambdas – No Parameter-Single Parameter - Multiple Parameters – With or Without Return Keyword-Comparator- Filter Collection Data-Streams-Generating Streams- Java Stream Interface Methods – For eachMap-Filter-Limit-Sorted.

LIST OF EXPERIMENTS

1. Write a Java Program to sort a list of Strings using Lambda function.
2. Write a Java Program to use map () to double each element in a list using Lambda.
3. Write a Java Program to filter even numbers from an ArrayList using Collections.
4. Write a Java program that concatenates all strings in a list into a single string using lambda expression.
5. Write a Java Program to create a stream that emits a sequence of numbers (e.g., 1 to 5) using a transformation operator.

LAB REQUIREMENTS:

1. Standalone desktops with Systems with either Netbeans or Eclipse / Windows operating system / JDK 1.8, 30 Nos..

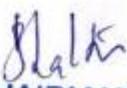
TOTAL : 45 PERIODS

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TEXT BOOKS:

1. Herbert Schildt, "Java - The Complete Reference", 8 Edition, McGrawHill Education, 2011.
2. E.Balagurusamy- "Programming with Java", 6 Edition, McGrawHill Education, 2019.

REFERENCES:

1. Paul Deitel, Harvey Deitel, "Java SE 8 for Programmers", 3 Edition, Pearson, 2015.
2. Steven Holzner, "Java 2 Blackbook", Dream Tech Press, 2011.
3. Timothy Budd, "Understanding Object-Oriented Programming with Java", Updated Edition, Pearson Education, 2000.
4. Kathy Sierra, Bert Bates, Trisha Gee, "Head First Java", 3rd Edition, O'Reilly, 2022.
5. Joshua Bloch, " Effective Java", Third Edition, Addison Wesley, 2018.

WEB REFERENCES:

1. https://www.w3schools.com/java/java_oop.asp
2. <https://www.edureka.co/blog/object-oriented-programming/>
3. https://www.ntu.edu.sg/home/ehchua/programming/java/J3a_OOPBasics.html

OUTCOMES**Upon completion of the course, the student will be able to:**

1. Comprehend Object Oriented Programming Concepts in Java. (K2)
2. Illustrate the purpose of packages, Java documents and Analyze the various types of Inheritance. (K2)
3. Construct the java applications using Java Exceptions and I/O Streams. (K3)
4. Understand the concept of Multithreading and Generic Classes in Java. (K2)
5. Apply the Object Oriented Programming Concepts to develop the Applications using Swings. (K3)
6. Make use of Lambda expressions, streams and reactive programming for real time applications. (K3)

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CO - PO, PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	2	2	-	-	-	-	-	-	-	3	2
CO2	3	3	3	2	-	-	-	-	-	-	-	2	3
CO3	3	3	3	2	-	-	-	-	-	-	-	3	2
CO4	3	1	3	2	-	-	-	-	-	-	-	2	2
CO5	3	2	3	2	-	-	-	-	-	-	-	3	2
CO6	3	2	3	2	-	-	-	-	-	-	-	3	2

SEMESTER - IV

24CIPT401 - SDG NO. 4 & 9	COMMUNICATION AND NETWORKING TECHNOLOGIES LABORATORY WITH THEORY	L	T	P	CP	C
		1	0	4	5	3

OBJECTIVES:

- To understand the protocol layering and physical level communication.
- To learn how to assess, select and customize communication.
- To understand networking technologies and standards.
- To control the network virus and provide security.
- To know how to apply various communication networks and develop an application.

MODULE - I INTRODUCTION TO NETWORKING & NETWORK MODELS 9

Networks - Types - OSI Model - Layers in OSI Model- TCP/ IP Protocol suite- Addressing- Performance - Transmission media - Switching - Circuit-switched Networks- Packet Switching- Communication Models- Client-Server- Publisher Subscriber- P2P

List of Experiments:

1. Simple Client Server Program
2. Implementation of IP address configuration.
3. Design and test Network Topology-Star, Bus, and Ring.

MODULE - II ARCHITECTURE & PROTOCOLS 8

AdHoc- WSN-MANET-VANET--Routing-Unicast, Multicast-IPV4&IPV6-MAC

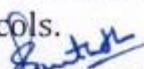
List of Experiments:

1. **Recommended by** To create scenarios and study the performance of networks with CSMA/CA protocol and compare with CSMA/CD protocols.

Board of Studies of CSE(SET) dept.

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Meeting No. 5 Dated: 17/04/25


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 Computer Science and Engineering
 (Internet of Things)

2. Implementation of distance vector routing algorithm.

MODULE - III COMMON NETWORK STANDARDS

7

802.11 & variants-Bluetooth & variants-802.15.4 & variants-Other Standards -NFC -LORA -DSRC, WAVE -Industrial & Automotive Networks -Vehicular networks (CAN, Modbus, Ethernet /Industrial Protocol, TTP/C, Flexray)

List of Experiments:

1. Bluetooth-based Appliance Control
2. Read temperature/humidity and upload to the cloud via Wi-Fi.

MODULE - IV NETWORK SECURITY & PRIVACY

7

Issues & Challenges - Security attacks - Security solutions- Electronic Mail Security- PGP-S/MIME - IPSecurity - Web Security - System Security- Intruders - Malicious Software - Cloud Security - Transport Level Security

List of Experiments:

1. To encrypt and decrypt a file using public-key cryptography.
2. To configure basic firewall rules using ip tables.
3. To observe the Transport Layer Security (TLS) handshake in HTTPS communication.

MODULE - V EMERGING NETWORKING PARADIGMS

7

Basics of Internet of Things (IoT) networking-Deploying virtual network functions in a controlled environment, CASE STUDY: 5G/6G Mobile Network Architecture and its applications.

List of Experiments:

1. Demonstrates typical IoT communication over network protocols.

MODULE - VI CASE STUDY & TOOLS

7

Asset Management, Industrial Automation, Smart Grid, Commercial Building Automation, Smart Cities

List of Experiments:

1. Motion sensors to turn off lights when no one is in a room.
2. Smart traffic lights that adapt to real-time congestion data.
3. RFID or GPS tracking of assets.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers Inc, 2012

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Meeting No. 5 Dated: 17/04/25

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(Internet of Things)*

2. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN:978-1-118-47347-4, Willy Publications, 2016.
3. Behrouz A. Forouzan, "Data communication and Networking", Fifth Edition, Tata McGraw Hill, 2013.
4. Jan Holler, "From Machine to Machine to the Internet of Things", first edition academic Press, 2014.

REFERENCE BOOKS

1. William Stallings, "Data and Computer Communications", Tenth Edition, Pearson Education, 2014.
2. Nader F. Mir, "Computer and Communication Networks", Second Edition Prentice Hall, 2014.

WEB RESOURCES:

1. https://www.tutorialspoint.com/data_communication_computer_network/data_communication_computer_network_tutorial.pdf.
2. <https://www.khanacademy.org/computing/computers-and-internet/xcae6f4a7ff015e7d:the-internet/xcae6f4a7ff015e7d:connecting-networks/a/computer-networks-overview>.
3. <https://csc-knu.github.io/sys-prog/books/Andrew%20S.%20Tanenbaum%20-%20Computer%20Networks.pdf>

ONLINE RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc22_cs19/preview.
2. https://onlinecourses.swayam2.ac.in/cec21_cs04/preview.
3. https://onlinecourses.nptel.ac.in/noc20_cs69/preview.

OUTCOMES

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

1. Apply networking concepts to build and manage data communication systems (K3)
2. Demonstrate communication standards in network-based applications. (K3)
3. Analyze and evaluate system components and workflows for effective optimization (K4).

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Board of Studies of CSE (3rd year) Dept.

Meeting No. 5 Dated: 17/04/25

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CO - PO, PSO MAPPING:

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

SEMESTER - IV

24CITP401 - SDG NO. 4	APTITUDE SKILLS - II	L	T	P	CP	C
		0	0	2	2	0

PROBLEM SOLVING USING JAVA - PHASE 1**OBJECTIVES:**

- Develop strong algorithmic problem-solving skills using Java
- Enable students to analyze problems and design efficient solutions
- Familiarize students with coding patterns used in technical interviews and prepare students for competitive programming and placement coding rounds

MODULE - I FOUNDATIONS OF JAVA PROBLEM SOLVING **16**

Competitive programming mindset, Understanding problem statements and constraints, Java input and output handling, Time and space complexity, Asymptotic notations, Loop and recursion analysis, Arrays and strings problem patterns, Prefix sum, Sliding window, Two-pointer techniques.

MODULE - II SEARCHING, SORTING AND ADVANCED TECHNIQUES **15**

Binary search patterns, Search on answer technique, Sorting-based problem solving, Stack and queue applications, Monotonic stack, Simulation problems, Recursion templates, Backtracking framework, Constraint-based problem solving.

MODULE - III DYNAMIC PROGRAMMING, GREEDY AND GRAPH BASICS **14**

Dynamic programming principles, Memorization and tabulation, One-dimensional and two-dimensional DP problems, Greedy strategies, Interval problems, Graph traversal basics – BFS and DFS, Competitive coding strategies.

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TOTAL: 45 PERIODS

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REFERENCES:

1. Herbert Schildt, Java: The Complete Reference, McGraw Hill.
2. E. Balagurusamy, Programming with Java, McGraw Hill Education

ONLINE RESOURCES

1. LeetCode - <https://leetcode.com>
2. HackerRank - <https://www.hackerrank.com>
3. GeeksforGeeks - Java and DSA Track

LIFE SKILLS, RANGER AND ROVER & BIS STANDARDS - PHASE 2**OBJECTIVES:**

- Explore core domain BIS standards related to Information security and AI.
- Implement strategies to learn career and managerial skills for career growth.

MODULE - I JEEVAN KAUSHAL 2.0 - CAREER SKILLS AND MANAGERIAL SKILLS

14

Group Discussion Skills - Meaning and Methods of Group Discussion - Procedure of Group Discussion - Group Discussion - Simulation - Group Discussion - Common Errors.

Managerial Skills - Basic Managerial Skills - Planning for effective management - How to organize teams? - Recruiting and retaining talent - Delegation of tasks - Learn to coordinate - Conflict management - Self-management Skills - Understanding self-concept - Developing self-awareness - Self-examination - Self-reflection and Introspection - Self-regulation.

Entrepreneurial Skills - Basics of Entrepreneurship - Meaning of entrepreneurship - Classification and types of entrepreneurship - Traits and competencies of entrepreneur - Creating Business Plan - Problem identification and idea generation - Idea validation - Pitch making.

Managing Personal Finance - Budgeting - Setting personal goals - Estimate likely expenses Monitor spending to obtain the most value for the available funds - Saving and Investing - Advantages of saving money - Concept of present and future value of money.

MODULE - II RANGER AND ROVER

10

Scouting for Boys: Scout Craft, Campaigning.

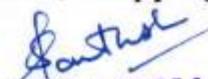
Knots: Managing of rope, types of ropes and uses, Basic Knots: - Clove Hitch, Reef Knot, Fisherman knot, Sheet bend, Bowline, Sheep shank, whippings.

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Growing Together: Understanding the growth context.

Intergenerational Dialogue: How to enhance learning and cooperation across generations.

MODULE - III INFORMATION SECURITY & ARTIFICIAL INTELLIGENCE 6

Information security, network security and privacy protection:

Introduction to the standards and concepts related to security [CIA (Confidentiality, Integrity, and Availability)] and privacy.

Software - Quality Assurance, Life Cycle & Testing: Introduction to Software life cycle processes and Software Testing (IS 16124 and IS 11291).

Artificial Intelligence: Introduction to the concepts of Artificial Intelligence and related standards:

- Overview of trustworthiness in artificial intelligence.
- Framework for Artificial Intelligence (AI) Systems Using Machine Learning (ML).
- AI system life cycle processes.
- Data life cycle framework.

TOTAL: 30 PERIODS

REFERENCES:

1. Curriculum and Guidelines for Life Skills (Jeevan Kaushal) 2.0, UGC, New Delhi.
2. A World Built on Standards: A Textbook for Higher Education, Published by: Danish Standards Foundation, 2015.
3. SO / IEC Guide 59, BIS Standards Formulation Manual, 2nd Revision, 2022.

ONLINE RESOURCES

1. https://lms.scout.org/courses/show/214175?force_course_hub=true
2. https://lms.scout.org/courses/show/214194?force_course_hub=true

OUTCOMES

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

1. Interpret problem statements and develop Java programs with appropriate complexity analysis.
2. Apply array, string, searching, sorting, stack, and queue based problem-solving techniques.
3. Design solutions using recursion, backtracking, and dynamic programming approaches.
4. Solve real-time and placement-oriented problems using greedy techniques and graph traversal basics.

Recommended by

- Demonstrate career and managerial skills. (K2)
- Understand BIS standards for Information security and AI domain. (K2)

CO - PO, PSO MAPPING:

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CO1	3	3	2	2	2	-	-	-	-	-	2	2	2
CO2	3	3	3	2	2	-	-	-	-	-	2	-	-
CO3	3	3	3	3	2	-	-	-	-	-	2	2	2
CO4	3	3	3	2	3	-	-	-	2	1	3	-	-
CO5	-	-	-	-	-	3	-	-	1	-	2	2	2
CO6	-	-	-	-	-	3	-	-	1	-	2	2	2

SEMESTER - IV

24CIID401 - SDG NO. 4,11,15	INNOVATIVE DESIGN LAB - II	L	T	P	CP	C
		0	0	2	2	1

OBJECTIVES:

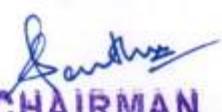
- To empower students to transform innovative ideas into viable venture blueprints through structured entrepreneurial exploration and opportunity framing.
- To provide experiential learning in adaptive product evolution by focusing on user-centric redesign, iterative testing, and technical refinement.
- To develop proficiency in assessing market traction, decoding customer behavior, and aligning product strategy with investment-readiness metrics.
- To instill a foundation of ethical entrepreneurship by integrating inclusive design principles, sustainability values, and responsible leadership.
- To enable data-driven innovation by leveraging field research, applying performance analytics, and integrating emerging technologies for solution optimization.
- To facilitate multidisciplinary problem-solving through advanced engineering integration, MVP systemization, and standards-compliant validation.

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COURSE METHODOLOGY:

1. This initiative is designed to inculcate ethical principles of research and to get involved in a life-long learning process for the students, focusing on the practical execution and refinement of entrepreneurial ventures.
2. The project work must involve the continuous development, iterative enhancement, and potential launch of an entrepreneurial solution. It must also include appropriate elements of the following: compliance with advanced engineering standards, iterative design analysis, enhanced prototyping, robust experimentation, real-world user feedback collection, data correlation, and advanced software/hardware development for the solution.
3. Projects can be individual work or group projects, with a maximum of Three students. In case of a group project, each student must submit an individual project report clearly specifying their unique contributions to the collective work.
4. On completion of the project, the student shall submit a detailed project report encompassing the evolution of their venture, technical implementation, market validation, and future roadmap. The project shall undergo a formal review process, after which the report will be evaluated. Students shall appear for a mandatory viva-voce examination on the project, approved jointly by the Coordinator and the respective project guide.

EVALUATION:

1. First evaluation (Immediately after first internal examination): 20 marks (Focus on refined problem statement, advanced MVP design, and detailed development plan)
2. Second evaluation (Immediately after second internal examination): 30 marks (Focus on prototype/MVP implementation, initial testing, and preliminary market validation results)
3. Final evaluation (Last week of the semester): 50 marks (Focus on the complete refined solution, comprehensive market validation, growth strategy, final project report, and viva-voce)

Note: All three evaluations are mandatory for course completion and for awarding the final grade.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

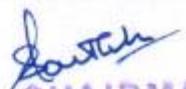
1. Apply structured entrepreneurial exploration to convert innovative ideas into venture blueprints, incorporating user-centric and iterative design approaches. (K4)

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2. Assess customer behavior and market traction to align product strategies with ethical and sustainable entrepreneurship principles. (K5)
3. Integrate multidisciplinary knowledge, field data, and emerging technologies to optimize and validate engineered solutions. (K6)

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CO2	3	3	2	-	-	-	-	2	-	-	-	2	2
CO3	3	3	3	-	-	-	-	2	-	-	-	2	2

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through Quality education.*



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College Campus

Sai Leo Nagar, West Tambaram,
Chennai - 600 044. Ph : 044-2251 2222

Administrative Office

"Sai Bhavan", 31B, Madley Road, T.Nagar,
Chennai - 600 017. Ph : 044-4226 7777
e-mail : sairam@sairamgroup.in

www.sairamgroup.in

