Er. PERUMAL MANIMEKALAI COLLEGE OF ENGINEERING

Er. PERUMAL MANIMEKALAI COLLEGE OF ENGINEERING

(An Autonomous Institution–Affiliated to Anna University, Chennai)

Koneripalli, Hosur – 635117.

PMC
TECH
INSPIRE TO INNOVATE
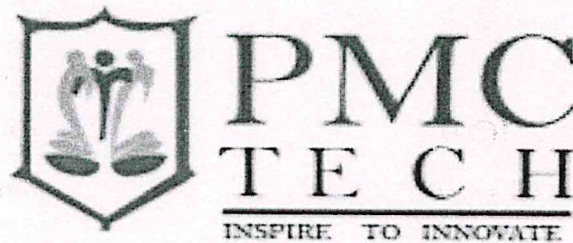
ACADEMIC REGULATIONS 2023 (R23)
Curriculum and Syllabi
(Version 1)

B.E. COMPUTER SCIENCE AND ENGINEERING

(Applicable from 2023 -24 onwards)

CHOICE BASED CREDIT SYSTEM
B. E. COMPUTER SCIENCE AND ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES (PEO's)

- **PEO1:** Have good knowledge and skills in fast evolving computer science engineering tools and systems, towards employability, higher studies and research.
- **PEO2:** Develop high end software and firmware systems though technical, problem solving and soft skills with ethical standards.
- **PEO3:** Believe in self, nurture to be a team member with leadership qualities and lifelong learning attitude to contribute for the sustainable development of the modern society.

PROGRAM OUTCOMES (PO's)

- **PO1 Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering Problems.
- **PO2 Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- **PO3 Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health, safety, cultural, societal and environmental considerations.
- **PO4 Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis, and interpretation of data and synthesis of the information to provide valid conclusions.
- **PO5 Modern tool usage:** Create, select, apply appropriate techniques, resources, modern engineering and IT tools including prediction and modeling to complex engineering activities with an Understand of the limitations.
- **PO6 The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7 Environment and sustainability:** Understand the impact of the professional engineering solutions in societal, environmental contexts, demonstrate the knowledge and need for sustainable development.
- **PO8 Ethics:** Apply ethical principles, commit to professional ethics, responsibilities and norms of the engineering practice.
- **PO9 Individual and team work:** Function effectively as an individual, as a member or leader in diverse teams and in multidisciplinary settings.
- **PO10 Communication:** Communicate effectively on complex engineering activities with the engineering community with society at large being able to comprehend, write effective reports, design documentation, make effective presentations and receive clear instructions.
- **PO11 Project management and finance:** Demonstrate knowledge, Understand of the engineering and management and leader in a team, to manage projects and in multidisciplinary environments.
- **PO12 Life-long learning:** Recognize the need, ability to engage in independent and lifelong learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's)

BE(CSE)

PMC
TECH
INSPIRE TO INNOVATE
Er. PERUMAL MANIMEKALAI
COLLEGE OF ENGINEERING
Accredited by NAAC ('A' Grade) & NBA (B.E. - CSE | ECE | EEE | MECH & B.TECH. - IT)
AN AUTONOMOUS INSTITUTION

- **PSO1:** Apply standard practices in software development using open source programming environments to deliver a high quality and cost effective products and solutions.
- **PSO2:** Analyze and develop systems in the areas of networking, software engineering, artificial intelligence, machine learning, Internet of Things and Cloud computing to meet the industrial and societal needs.

PEO's-PO's & PSO's MAPPING

PEO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
PEO1	3	3	2	2	2	2	1	1	2	1	2	2	3	3
PEO2	3	3	3	3	2	2	2	2	2	2	2	2	3	2
PEO3	3	3	3	2	2	2	1	1	2	2	2	3	3	3

BE(CSE)

REGULATIONS 2023 - AUTONOMOUS

CHOICE BASED CREDIT SYSTEM
B. E. COMPUTER SCIENCE AND ENGINEERING
CURRICULUM FOR I TO VIII SEMESTERS

SEMESTER I

S.NO.	COURSE CODE	COURSE NAME	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
0		Induction Programme – 2 Weeks	-	-	-	-	-	0
THEORY								
1.	PUCC1HM01	Professional English - I	HM	2	-	-	2	2
2.	PUCC1BS01	Matrices and Calculus	BS	3	1	-	4	4
3.	PUCC1BS02	Engineering Physics	BS	3	-	-	3	3
4.	PUCC1BS03	Engineering Chemistry	BS	3	-	-	3	3
5.	PUCC1BE01	Engineering Graphics	BE	2	-	4	6	4
6.	PUCC1HM02	Heritage of Tamils தமிழர்மரபு	HM	1	-	-	1	1
PRACTICALS								
7.	PUCC1PL01	Professional English - I	HM	-	-	4	4	2
8.	PUCC1PL02	Physics and Chemistry Laboratory	BS	-	-	4	4	2
9.	PUCC1HM03	Wellness	HM	-	-	1	1	0
		Total		14	1	13	28	21

RE (CSE):

SEMESTER II

S.NO.	COURSE CODE	COURSE NAME	CATEGORY	L	T	P	TOTAL CONTACT PERIOD	CREDITS
THEORY								
1.	PUCC2HM04	Professional English-II	HM	2	-	-	2	2
2.	PUCC2BS04	Statistics and Numerical Methods	BS	3	1	-	4	4
3.	PUCS2BS05	Physics for Information Science	BS	3	-	-	3	3
4.	PUCC2BE02	Basic Electrical & Electronics Engineering	BE	3	-	-	3	3
5.	PUCS2BE03	Fundamentals of Computer Science	BE	3	-	-	3	3
6.	PUCC2BE04	Problem Solving using Python Programming	BE	2	-	-	2	2
7.	PUCC2HM05	Tamils and Technology தமிழரும் தொழில்நுட்பமும்	HM	1	-	-	1	1
PRACTICALS								
8.	PUCC2PL03	Professional English - II	HM	-	-	4	4	2
9.	PUCC2PL04	Problem Solving using Python Programming	BS	-	-	4	4	2
10.	PUCC2PL05	Civil and Mechanical Engineering Practices	BE	-	-	2	2	1
11.	PUCC2PL06	Electrical and Electronics Engineering Practices	BE	-	-	2	2	1
12.	PUCC2HM06	Wellness	HM	-	-	1	1	0
		Total		17	1	13	31	24

BE (CSE) 4

SEMESTER III

S.NO.	COURSE CODE	COURSE NAME	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	PUCS3BS06	Mathematics for Computer Science and Engineering	BS	3	1	-	4	4
2.	PUCS3PC01	Computer Organization and Architecture	PC	3	1	-	4	4
3.	PUCS3PC02	Foundations of Data Science	PC	3	-	-	3	3
4.	PUCS3PC03	Data Structures and Algorithms	PC	3	-	2	5	4
5.	PUCS3PC04	Object Oriented Programming	PC	3	-	-	3	3
6.	PUCC3MCXX	Mandatory Course – 1 (Non-Credit)	MC	2	-	-	2	0
PRACTICALS								
7.	PUCS3PL01	Data Science Laboratory	PC	-	-	4	4	2
8.	PUCS3PL02	Object Oriented Programming Laboratory	PC	-	-	4	4	2
9.	PUCC3HM07	Extension Activities	HM	-	-	1	1	0
		Total		17	1	11	29	22

SEMESTER IV

S.NO.	COURSE CODE	COURSE NAME	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT T	CREDITS
				L	T	P		
THEORY								
1.	PUCC4BS07	Environmental Science & Sustainability	BS	3	-	-	3	3
2.	PUIT4PC02	Operating Systems	PC	3	1	-	4	4
3.	PUAD4PC01	Artificial Intelligence and Machine Learning	PC	3	-	-	3	3
4.	PUIT4PC03	Database Management Systems	PC	3	-	-	3	3
5.	PUCS4PC05	Software Engineering	PC	3	-	-	3	3
6.	PUCC4MCXX	Mandatory Course – II	MC	2	-	-	2	0
PRACTICAL								
7.	PUIT4PL01	Operating Systems Laboratory	PC	-	-	4	4	2
8.	PUIT4PL02	Database Management Systems Laboratory	PC	-	-	4	4	2
9.	PUAD4PL01	Artificial Intelligence and Machine Learning Lab	PC	-	-	4	4	2
10	PUCC4HM08	Extension Activities	HM	-	-	1	1	0
		Total		17	-	13	30	22

BE(CSE)5

SEMESTER V

S.NO.	COURSE CODE	COURSE NAME	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	PUCC5HM10	Universal Human Values & Ethics	HM	3	-	-	3	3
2.	PUCS5PC06	Computer Networks	PC	3	-	-	3	3
3.	PUCS5PC07	Theory of Computation	PC	3	1	-	4	4
4.	PUCS5PEXX	Professional Elective – I	PE	3	-	-	3	3
5.	PUCS5PEXX	Professional Elective – II	PE	3	-	-	3	3
6.	PUCS5IL01	Industry Lecture	IL	1	-	-	1	0
PRACTICAL								
7.	PUCS5PL03	Computer Networks Laboratory	PC	-	-	4	4	2
8.	PUCS5PL04	Software Engineering Laboratory	PC	-	-	4	4	2
9.	PUCC5PD01	Professional Development	SD	-	-	2	2	1
10.	PUCC5IP01	In-plant Training/Internship	SD	-	-	-	-	-
		Total		16	1	10	27	21

- In-plant-Training/Internship – 2 Weeks of training each during 4th/5th/6th Semester – During college hours or semester vacation. Total 4 weeks of training – 2 Credits

SEMESTER VI

S.NO.	COURSE CODE	COURSE NAME	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT	CREDITS
				L	T	P		
THEORY								
1.	PUCS6PC08	Compiler Design	PC	3	1	-	4	4
2.	PUCS5PEXX	Professional Elective – III	PE	3	-	-	3	3
3.	PUCS5PEXX	Professional Elective – IV	PE	3	-	-	3	3
4.		Open Elective –I (Management)	OE	3	-	-	3	3
5.		Open Elective – II	OE	3	-	-	3	3
6.	PUCS5IL02	Industry Lecture	SD	1	-	-	1	0
PRACTICAL								
7.	PUCS3PL05	Compiler Design Laboratory	PC	-	-	4	4	2
8.	PUCS3PL06	IOT Laboratory	PC	-	-	4	4	2
9.	PUCS6VA0	Technical Skill Development	SD	-	-	2	2	1
10.	PUCC6PD0	Professional development	SD	-	-	2	2	1
11.	PUCC6IP02	• In-plant	SD	-	-	-	-	-
		Total		16	1	12	29	22

- In-plant-Training/Internship – 2 Weeks of training each during 4th/5th/6th Semester – During college hours or semester vacation
- Any one Open Elective has to choose from the Management verticals. Total 4 weeks of Training – 2 Credits. Total 4 weeks of Training – 2 Credits

SEMESTER VII

S.NO.	COURSE CODE	COURSE NAME	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	PUCS7PC09	Cryptography and Cyber Security	PC	3	1	-	4	4
2.	PUCS5PEXX	Professional Elective – V	PE	3	-	-	3	3
3.	PUCS5PEXX	Professional Elective – VI	PE	3	-	-	3	3
4.		Open Elective – III	OE	3	-	-	3	3
5.		Open Elective – IV	OE	3	-	-	3	3
PRACTICAL								
6.	PUCS7PL07	Security Laboratory	PC	-	-	4	4	2
7.	PUCC7VA02	Technical Skill Development	SD	-	-	2	2	1
8.	PUCS7PR01	Project Phase –I	PR	-	-	2	2	1
		Total		15	1	8	24	20

SEMESTER VIII

S.NO.	COURSE CODE	COURSE NAME	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	PUCS7PR02	Project Phase – II/Internship	PR	-	-	24	24	10
		Total		-	-	24	24	10

*Project work-Mandatory

*Internship-optional-3 to 6 Months

MANDATORY COURSES I

(Semester – III)

Sl. No.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS
				L	T	P	
1.	PUCC3MC01	Women and Gender Studies	MC				3
2.	PUCC3MC02	Elements of Literature	MC				3
3.	PUCC3MC03	Film Appreciation	MC				3
4.	PUCC3MC04	The Constitution of India	MC				3

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MANDATORY COURSES II

(Semester – IV)

Sl. No.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS
				L	T	P	
1.	PUCC4MC01	Practices for well being	MC				3
2.	PUCC4MC02	Indian History of Science and Technology	MC				3
3.	PUCC4MC03	Political and Economic Thought for a Humane Society	MC				3
4.	PUCC4MC04	Sociology, Society and Culture	MC				3

SUMMARY

		B.E COMPUTER SCIENCE AND ENGINEERING							
S.NO	**Subject Area**	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII/VIII**	**Total Credits**
		Credits Per Semester							
1	HM	5	5			3			13
2	BS	12	9	4	3				28
3	BE	4	10						14
4	PC			18	19	11	8	6	62
5	PE					6	6	6	18
6	OE						6	6	12
7	PR							11	11
8	MC								0
9	PD					1	2	1	4
Total		21	24	22	22	21	22	30	162

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 162

HM	Humanities, Management, Wellness & Extension
BS	Basic Science
BE	Basic Engineering
PC	Professional Core
PE	Professional Elective
OE	Open Elective
MC	Mandatory Non-Credit
PR	Project
SD	Professional Development, In-plant Training/Internship, Industrial lecture ,Value added Courses

SEMESTER – I

(Common to all B.E.,/B.Tech. Courses)

S. NO.	COURSE CODE	COURSE NAME	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
0		Induction Programme - 2 Weeks	-	-	-	-	-	0
THEORY								
1	PUCC1HM01	Professional English - I	HM	2	-	-	2	2
2	PUCC1BS01	Matrices and Calculus	BS	3	1	-	4	4
3	PUCC1BS02	Engineering Physics	BS	3	-	-	3	3
4	PUCC1BS03	Engineering Chemistry	BS	3	-	-	3	3
5	PUCC1BE01	Engineering Graphics	BE	2	-	4	6	4
6	PUCC1HM02	Heritage of Tamils தமிழர்மரபு	HM	1	-	-	1	1
PRACTICALS								
7	PUCC1PL01	Professional English - I	HM	-	-	4	4	2
8	PUCC1PL02	Physics and Chemistry Laboratory	BS	-	-	4	4	2
9	PUCC1HM03	Wellness	HM	-	-	1	1	0
							28	21

PUCC1HM01	PROFESSIONAL ENGLISH I	L T P C
		2 0 0 2

COURSE OBJECTIVE

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Listening , Speaking ,Reading and Writing skills.
- Equip students to study academic subjects more effectively by using the theoretical and practical components of English syllabus
- Develop communication skills in formal and informal situations.

UNIT I: INTRODUCTION TO COMMUNICATION — 6

EFFECTIVE COMMUNICATION :

What is effective communication? (Explain using activities) What are the seven C's of effective communication? What are key language skills? What is LSRW? How does one develop language and communication skills?

FUNDAMENTALS OF COMMUNICATION :

Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. Writing - Writing emails / letters introducing oneself. Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags. Vocabulary - Synonyms and Antonyms , Abbreviations & Acronyms (as used in technical contexts).

UNIT II: NARRATION AND SUMMATION — 6

Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs. Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.) Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions. Vocabulary - Word forms (prefixes& suffixes);. Phrasal verbs

UNIT III: DESCRIPTION OF A PROCESS / PRODUCT — 6

Reading — Reading advertisements, gadget reviews; user manuals. Writing - Writing definitions; instructions; and Product /Process description. Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses. Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words).

UNIT IV: CLASSIFICATION AND RECOMMENDATIONS — 6

Reading — Newspaper articles; Journal reports –and Non Verbal Communication (tables, pie charts etc,.). Writing — Note-making / Note-taking (*Study skills to be taught, not tested); Writing recommendations; Transferring information from non verbal (chart , graph etc, to verbal mode) Grammar — Articles; Pronouns - Possessive & Relative pronouns. Vocabulary - Collocations; Fixed / Semi fixed expressions.

UNIT V: EXPRESSION — 6

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

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

COs	Course Outcome (CO)	Blooms Taxonomy
CO-1	Apply Elements of communication to LSRW on self introduction and introduction of others	Apply
CO-2	Comprehend Complex academic texts for narrating experience and events	Understand
CO-3	Describe non verbal process and products transferring into verbal texts	Understand
CO-4	Prepare Journal reports and newspaper article	Apply
CO-5	Write descriptive and narrative essay	Apply

CO – PO Mapping

Course Outcomes	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	3	-	2	3	3	1	3
CO2	-	-	-	-	-	2	-	1	3	3	-	3
CO3	-	-	-	-	-	2	-	2	3	3	-	3
CO4	-	-	-	-	-	2	-	1	3	3	1	3
CO5	-	-	-	-	-	1	-	1	2	2	-	1

*For Entire Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO

TEXT BOOK:
1. Faculty, Department of English, Anna University, English for Engineers & Technologists, Orient Blackswan Private Ltd. 2020

2. Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani Department of English, Anna University.,English for Science & Technology, Cambridge University Press, 2021.

REFERENCES:
1. Meenakshi Raman & Sangeeta Sharma ,Technical Communication – Principles And Practices , Oxford Univ. Press, New Delhi. 2016,
2. M. Ashraf Rizvi, Effective Technical Communication,Mc Graw Hill, 2017
3. Michael Swan, Practical English Usage, Oxford, 2016
4. N P Sudharshana , C Savitha),English for Engineers, Cambridge University Press,2018
5. Sajitha Jai Prakash, Sowmya JAyaprakash, Technical Communication English – I, Himalaya Publishing House, 2018

WEBSITE REFERENCE:
1. http://www.indiabix.com/group-discussion/topics-with-answers/
2. http://www.dailywriting tips .com/

NPTEL/ SWAYAM/ MOOC REFERENCE:
1. https://digimat.in/nptel/courses/video/109106067/L04.html (better spoken english)
2. https://onlinecourses.nptel.ac.in/noc20_hs14/preview (speak effectively)

PUCC1BS01	MATRICES AND CALCULUS	L T P C
		3 1 0 4

COURSE OBJECTIVE

- To develop the use of matrix algebra techniques that are needed by engineers for practical applications.

- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT I: MATRICES	9+3

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

UNIT II DIFFERENTIAL CALCULUS	9+3

Representation of functions - Limit of a function-L-Hospital rule - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation- Applications: Maxima and Minima of functions of one variable-production quantity for optimization technique-volume optimization of cone circumscribed around the sphere-rectangular fencing problems (Not for Examination).

UNIT III - FUNCTIONS OF SEVERAL VARIABLES	9+3

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers. Applications: Find the size of the rectangular prism which gives minimum surface area for fixed volume. Find the breadth and depth of the rectangular beam cut from a cylindrical rod for maximum strength.

UNIT IV - INTEGRAL CALCULUS	9+3

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

UNIT - V: MULTIPLE INTEGRALS	9+3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Applications: Moments and centres of mass, moment of inertia.

TOTAL: 45 PERIODS

BE (CSE) 16

COURSE OUTCOMES:

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

COs	Course outcomes(CO)	Blooms Level
CO 1	Use the matrix algebra methods for solving practical problems	Apply
CO2	Apply differential calculus tools in solving various application problems	Apply
CO 3	Able to analyze differential calculus ideas on several variable functions.	Analyze
CO 4	Apply different methods of integration in solving practical problems.	Apply
CO 5	Apply multiple integral ideas in solving areas, volumes and other practical problem	Apply

CO-PO Mapping

Course Outcomes	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	-	-	-	1
CO2	3	3	3	2	-	-	-	-	-	-	-	1
CO3	3	3	-	3	-	-	-	-	-	-	-	1
CO4	3	3	2	2	-	-	-	-	-	-	-	1
CO5	3	3	2	-	-	-	-	-	-	-	-	1

TEXT BOOK:

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.

REFERENCES:

1. Anton. H, Bivens. I and Davis. S, "Calculus", Wiley, 10th Edition, 2016
2. Jain . R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
3. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
4. Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus", 14th Edition, Pearson India, 2018.

WEBSITE REFERENCE:

1. **https://3lihandam69.files.wordpress.com/2018/10/calculus-10th-edition-anton.pdf** - Calculus 10th Edition anton.pdf

2. https://www.hzu.edu.in/engineering/Higher%20Engineering%20Mathematics.pdf - Higher Engineering Mathematics, Sixth Edition
3. **https://dl.konkur.in/post/Book/Paye/Thomas-Calculus-14th-Edition-%5Bkonkur.in%5D.pdf**
    https://archive.org/details/advanced-engneering-maths - High advanced Engineering Mathematics

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. NPTEL: Matrix theory, Prof.Chandra, R. Murthy Indian institute of Science -Bangalore.

2. NPTEL: Basic Calculus, Prof. Arindama Singh Department of Mathematics -IIT Madras

3. SWAYAM: Online course – Integral and Vector Calculus, Prof.Hari Shankar Mahato, IIT -Kharagpur.

PUCC1BS02	ENGINEERING PHYSICS	L T P C
		3 0 0 3

COURSE OBJECTIVE

- To make the students effectively to achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to be successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNIT I MECHANICS	9

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

UNIT II ELECTROMAGNETIC WAVES	9

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 - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, momentum and radiation pressure - Cell-phone reception - Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

UNIT III OSCILLATIONS, OPTICS AND LASERS	9

Simple harmonic motion - resonance - waves on a string - standing waves - traveling waves – Energy transfer of a wave - sound waves - Doppler effect - reflection and refraction of light waves – total internal reflection - interference - interferometers - air wedge experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients – population inversion - Nd-YAG laser, CO_2 laser, semiconductor laser - Basic applications of lasers in industry.

UNIT IV BASIC QUANTUM MECHANICS	9

Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle

UNIT V APPLIED QUANTUM MECHANICS	9

The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Kronig-Penney model and origin of energy bands.

TOTAL: 45 PERIODS

BE (CSE) 1ˢᵗ

COURSE OUTCOMES:

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

	Course outcomes	Blooms Level
CO 1	Comprehend the basics and importance of mechanics	Understand
CO2	Illustrate the properties of electromagnetic waves and its propagation in vacuum and medium.	Understand
CO 3	Demonstrate a strong foundational knowledge in oscillations, optics and lasers	Understand
CO 4	Explain the concepts of quantum physics	Understand
CO 5	Comprehend and apply quantum mechanical principles towards the formation of energy bands	Understand

CO – PO Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	--	1
CO2	3	3	1	1	1	1	-	-	-	-	-	-
CO3	3	2	2	-	1	1	-	-	-	-	-	1
CO4	3	3	1	1	-	-	-	-	-	-	-	-
CO5	3	3	2	-	2	-	-	-	-	-	-	..

TEXT BOOK

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

REFERENCES:

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2019.
2. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
3. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
4. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. SpringerVerlag,2012.

NPTEL/ SWAYAM/ WEBSITE REFERENCE:

1. https://nptel.ac.in/courses/112104114 - Dynamics of Machines, IIT Kanpur, Prof. Amitabha Ghosh
2. https://onlinecourses.nptel.ac.in/noc19_ph08/preview - Introduction to Electromagnetic Theory by Dr. Manoj Kumar Harbola, IIT Kanpur
3. https://nptel.ac.in/courses/115105104, Modern Optics, IIT Kharagpur, Prof. Partha Roy Choudhury
4. https://archive.nptel.ac.in/courses/115/106/115106119/ - Waves & Oscillations, Coordinated by IIT Madras

BE(CSE)L

PUCC1BS03	ENGINEERING CHEMISTRY	L T P C
		3 0 0 3

COURSE OBJECTIVE	

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and properties of polymers and composites
- To introduce the basic concepts of corrosion, alloys and corrosion preventive methods
- To facilitate the understanding of different type of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes, applications of energy conversion and storage devices.

UNIT I:	WATER AND ITS TREATMENT	9

Water: Sources and impurities, Water quality parameters: Definition and significance of - colour, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, fluoride and arsenic. Hardness – types: temporary and permanent – expression of hardness in terms of $CaCO_3$. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming & foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and Calgon conditioning) and External treatment – Ion exchange demineralization and zeolite process. Desalination of brackish water: Reverse Osmosis.

UNIT II:	POLYMER CHEMISTRY AND COMPOSITES	9

Polymers-definition-types: thermoplastics and thermosetting plastics, polymerization-types-addition and condensation polymerization-free radical polymerization mechanism-Plastics, classification-preparation, properties and uses of PVC, Teflon, polycarbonate, nylon 6,6, PET-Rubber- types- synthetic rubber-butyl rubber- vulcanization of rubber, Composites-definition, types polymer matrix composites-FRP only

UNIT III:	CORROSION AND ALLOYS	9

CORROSION: causes- factors- types- chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control - material selection and design aspects – electrochemical protection – sacrificial anode method and impressed current cathodic method.
ALLOYS: Introduction- Definition- Properties of alloys- Significance of alloying, Functions and effect of alloying elements- Ferrous alloys- Nichrome and Stainless steel – heat treatment of steel; Non-ferrous alloys – brass and bronze.

UNIT IV:	FUELS AND COMBUSTION	9

FUELS: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil – cetane number; Power alcohol and biodiesel.
COMBUSTION OF FUELS: Introduction: Calorific value - higher and lower calorific values, Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis-ORSAT Method. CO_2 emission and carbon foot print.

| UNIT V: | ENERGY SOURCES AND STORAGE DEVICES | 9 |

NUCLEAR ENERGY: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Geothermal energy.

BATTERIES: Types of batteries, Primary battery- dry cell, Secondary battery- lead acid battery and lithium-ion- battery; Electric vehicles – working principles; Fuel cells: H_2-O_2 fuel cell, microbial fuel cell; Super capacitors: Storage principle, types and examples.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

Course Outcomes	Course outcomes	Blooms Level
CO 1	Explain the types of water and water treatment techniques	Understand
CO2	Demonstrate the knowledge of polymers and composites	Understand
CO 3	Apply the knowledge of corrosion and alloys	Understand
CO 4	Explain the types of fuels and the manufacturing of secondary fuels	Understand
CO 5	Illustrate the types of energy sources	Understand

CO – PO Mapping

Course Outcomes	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	1	1	1	1	-	1	-	2
CO2	3	2	1	1	1	1	1	1	-	1	-	2
CO3	3	2	1	1	1	1	1	1	-	1	-	2
CO4	3	2	2	1	1	1	2	1	-	1	-	2
CO5	3	2	2	1	1	1	2	1	-	1	-	2
	3	2	1.4	1	1	1	1.4	1	-	1	-	2

*For Entire Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO

TEXT BOOK:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.

2. S.S. Dara, "A Text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

REFERENCES:

1. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
2. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
3. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
4. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.
5. Gowariker V.R., Viswanathan N.V. and Jayadev Sreedhar, "Polymer Science", New Age International P (Ltd.,), Chennai, 2009.

WEBSITE REFERENCE:

1. https://vlab.amrita.edu/?sub=2&brch=193&sim=1548&cnt=1 - Water analysis-Determination of Chemical parameters (Theory): Inorganic Chemistry Virtual Lab: Chemical Sciences: Amrita Vishwa Vidyapeetham Virtual Lab
2. https://www.chemistryviews.org/debating-the-everyday-impact-of-polymer-materials - Debating the Everyday Impact of Polymer Materials – Chemistry Views
3. https://batteryuniversity.com – Learn about batteries
4. https://wiseinternational.org/nuclear-energy -Nuclear Energy Wise international

NPTEL/ SWAYAM/ MOOC REFERENCE:

NPTEL: Basic courses-Sem 1 and 2 - Engineering Chemistry-I

PUCC1BE01	ENGINEERING GRAPHICS	L T P C
		2 0 4 4

COURSE OBJECTIVE

- Drawing engineering curves
- Drawing freehand sketch of simple objects
- Drawing orthographic projection of solids and section of solids.
- Drawing development of solids
- Drawing isometric and perspective projections of simple solids.

CONCEPTS AND CONVENTIONS (Not for Examination)

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

UNIT - I PLANE CURVES AND FREEHAND SKETCHING	6+12

Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles Representation of Three-Dimensional objects – Layout of views-Freehand sketching of multiple views from pictorial views of objects

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

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes -Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method. Introduction to Basic Commands in auto CAD (Not for examination).

UNIT - III PROJECTION OF SOLIDS	6+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Practicing three-dimensional modelling of simple objects by CAD Software (Not for examination).

UNIT- IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6+12

Section of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Development of lateral surfaces of solids with cut-outs and holes. Practicing three-dimensional modelling of simple objects by CAD Software (Not for examination).

UNIT - V   ISOMETRIC AND PERSPECTIVE PROJECTIONS   6+12

Principles of isometric projection — isometric scale - isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method. Practicing three-dimensional modelling of isometric projection of simple objects by CAD Software (Not for examination).

TOTAL: (L=30; P=60) 90 PERIODS

COURSE OUTCOMES

On successful completion of this course, the student will be able to.

Course Outcomes	Course outcomes	Blooms level
CO1	Use BIS conventions and specifications for engineering drawing and construct the conic curves, involutes and cycloid.	Apply
CO2	Solve practical problems involving projection of lines and plane surfaces.	Apply
CO3	Draw the projections of 3D primitive objects like prisms, pyramids, cylinders and cones.	Apply
CO4	Develop the lateral surfaces of simple and truncated solids.	Analyze
CO5	Draw the orthographic, isometric and perspective projections of simple solids.	Analyze

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CO-PO MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	1	-	-	1	-	-	-	2	2	2
CO2	3	2	2	1	2	-	-	1	-	-	-	1	2	2
CO3	3	2	1	-	2	-	-	1	-	-	-	2	2	2
CO4	3	2	2	-	2	-	-	-	1	-	-	2	2	2
CO5	3	2	1	1	2	-	-	1	-	-	-	2	2	2

TEXT BOOKS:

1. Venugopal K. and Prabhu Raja V., "Engineering Graphics", 15th Edition, New Age International Pvt. Ltd., New Delhi, 2018.
2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.

REFERENCE BOOKS:

1. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015, New Delhi, 2015.
2. Basant Agrawal, Agrawal C.M., "Engineering Drawing", 2nd Edition, McGraw Hill Education, 2019.
3. Gopalakrishnana K.R. "Engineering Drawing", Volume. I & II, Subhas Publications, Bengaluru, 2014.
4. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.

PUBLICATION OF BUREAU OF INDIAN STANDARDS:	
1	IS10711 — 2001: Technical products Documentation — Size and layout of drawing sheets.
2	IS 9609 (Parts 0 & 1) — 2001: Technical products Documentation —Lettering.
3	IS 10714 (Part 20) — 2001 & SP 46 — 2003: Lines for technical drawings.
4	IS 11669 — 1986 & SP 46 —2003: Dimensioning of Technical Drawings.
5	IS 15021 (Parts 1 to 4) — 2001: Technical drawings — Projection Methods

SPECIAL POINTS APPLICABLE TO UNIVERSITY EXAMINATIONS ON ENGINEERING GRAPHICS:

1	There will be five questions, each of either-or type covering all units of the syllabus.
2	All questions will carry equal marks of 20 each making a total of 100.
3	The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4	The examination will be conducted in appropriate sessions on the same day

WEBSITE REFERENCE / NPTEL/ SWAYAM/ MOOC REFERENCE:

1	https://nptel.ac.in/courses/112102304
2	https://nptel.ac.in/courses/112103019
3	https://archive.nptel.ac.in/courses/112/102/112102304/
4	https://users.encs.concordia.ca/~nrskumar/Index_files/Mech211/Full%20Lecture/Lecture%201.pdf

PUCC1HM02	HERITAGE OF TAMILS		L T P C
			1 0 0 1

UNIT I:	LANGUAGE AND LITERATURE	3

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

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

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

UNIT III:	FOLK AND MARTIAL ARTS	3

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

UNIT IV:	THINAI CONCEPT OF TAMILS	3

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

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

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

	TOTAL: 15 PERIODS

TEXT-CUM-REFERENCE BOOK:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).

2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).

3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International\ statute 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) – Refernece Book.

PUCC1PL01	PROFESSIONAL ENGLISH - I LABORATORY	L T P C
		0 0 4 2

COURSE OBJECTIVE

- To improve the communicative competence of learners
- To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.
- To use language efficiently in expressing their opinions via various media

LIST OF ACTIVITIES

UNIT – I   12

Activity 1	Listening for general information-specific details - Audio / video : Gap Filling Activity
Activity 2	Creating a Brochure (technical context), Preparing Emails and letter of introduction
Activity 3	Telephone etiquette , making telephone calls, Self Introduction; Introducing a friend;
Activity 4	Role play : Politeness strategies- making polite requests, making polite offers, replying to polite requests and offers- understanding basic instructions(filling out a bank application for example)

UNIT – II   12

Activity 1	Listening to anecdotes / stories /Short films
Activity 2	Hints development
Activity 3	Listening to biographies/ News/ documentaries and interviews with celebrities: Narrating personal experiences / events
Activity 4	Listening the audio of field trips : Engaging in small talk- Describing experiences and feelings

UNIT – III   12

Activity 1	Listen to advertisements, gadget reviews and user manuals
Activity 2	Role play – Advertisement and reviews
Activity 3	Listening to product and process descriptions
Activity 4	Presenting a product :Giving instruction to use the product- explaining uses and purposes

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UNIT – IV			12
	Activity 1	Listen to data Interpretation (Graphs & chart) :	
	Activity 2	Prepare and describe the chart (pie chart,Bar chart, Flow chart & Tabular Chart)	
	Activity 3	listen to technical / general passage and Take Note	
	Activity 4	prepare a journal / an article	

UNIT – V			12
	Activity 1	Listening to TED Talks / debates /group discussion	
	Activity 2	Participate in debate	
	Activity 3	Participate in Group discussion	
	Activity 4	Presenting Technical / General Topic.	

TOTAL: 60 PERIODS

COURSE OUTCOMES: On successfulcompletion of this course, the student will be able to.

COs	Course Outcome (co)	Blooms Taxonomy
CO-1	Create Email and letter of introduction in formal and informal.	Apply
CO-2	Communicate effectively about personal experiences and events .	Apply
CO-3	Make Presentation on products and technical processes effectively .	Apply
CO-4	Transcode visual content appropriately.	Apply
CO-5	Participate in group discussion or debates.	Apply

CO – PO Mapping

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	3	-	1	2	3	-	3
CO2	-	-	-	-	-	2	-	2	2	3	-	3
CO3	-	-	-	-	-	2	-	2	3	3	-	2
CO4	-	-	-	-	-	2	-	1	3	3	-	2
CO5	-	-	-	-	-	2	-	2	3	3	-	3

TEXT BOOK:

1. Faculty ,Anna university , Orient Blackswan ,"English for Engineers and Technologists" Volume I ,2022.
2. Cambridge University Press ,"English for Science & Technology - II" , 2023.

REFERENCE:

1. Adrian Wallwork , Springer , "English for Academic Correspondence and Socializing" 2011.
2. Stella Cortrell , Red Globe Press, "The Study Skills Handbook" , 2019
3. Mathew Richardson , Charlie Creative Lab ,"Advanced Communication Skills" , 2020.
4. Jack C.Richards , "Interchange", Cambridge University Press , Fifth Edition, 2017
5. Mathew Richardson, Charlie Creative Lab ,"Advanced Communication Skills" , 2020

PUCC1PL02	PHYSICS AND CHEMISTRY LABORATORY	L T P C
	PHYSICS LABORATORY: (Any seven experiments to be conducted)	0 0 4 2

COURSE OBJECTIVE

- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student as an active participant in each part of all lab exercises.

LIST OF EXPERIMENTS

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending - Determination of Young's modulus
4. Uniform bending – Determination of Young's modulus
5. Laser- Determination of the wave length of the laser using grating
6. Air wedge - Determination of thickness of a thin sheet/wire
7. a) Optical fibre -Determination of Numerical Aperture and acceptance angle
   b) Compact disc- Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
10. Post office box -Determination of Band gap of a semiconductor.
11. Photoelectric effect
12. Michelson Interferometer.
13. Melde's string experiment
14. Experiment with lattice dynamics kit.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

COs	Course outcomes	Blooms Level
CO 1	Demonstrate the functioning of various physics laboratory equipment.	Apply
CO 2	Use graphical models to analyze laboratory data.	Analyze
CO 3	Use mathematical models as a medium for quantitative reasoning and describing physical reality.	Analyze
CO 4	Access, process and analyze scientific information.	Analyze
CO 5	Solve problems individually and collaboratively.	Apply

CO – PO Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	1	-	-	1	2	-	--	1
CO2	3	2	-	1	1	1	-	1	1	-	-	1
CO3	3	1	-	-	1	1	-	1	1	-	-	1
CO4	3	1	-	1	1	1	-	1	1	-	-	1
CO5	3	1	-	-	2	-	-	1	2	-	-	1

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

COURSE OBJECTIVE

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and alloys.
- To demonstrate the synthesis of nanoparticles

LIST OF EXPERIMENTS

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard.
2. Determination of types and amount of alkalinity in water sample. - Split the first experiment into two.
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.
7. Estimation of TDS of a water sample by gravimetry.
8. Determination of strength of given hydrochloric acid using pH meter.
9. Determination of strength of acids in a mixture of acids using conductivity meter.
10. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
11. Estimation of iron content of the given solution using potentiometer.
12. Estimation of sodium /potassium present in water using flame photometer.
13. Preparation of nanoparticles (TiO_2/ZnO/CuO) by Sol-Gel method.
14. Estimation of Nickel in steel
15. Proximate analysis of Coal

TOTAL: 30 PERIODS

COURSE OUTCOMES:

On successful completion of this course, the student will be able to.

COs	Course outcomes	Blooms Level
CO 1	To analyze the quality of water samples with respect to their acidity, alkalinity, hardness and DO.	Analyze
CO2	To determine the amount of metal ions through volumetric and spectroscopic techniques	Analyze
CO3	To analyze and determine the composition of alloys	Analyze
CO 4	To learn simple method of synthesis of nanoparticles	Analyze
CO 5	To quantitatively analyze the impurities in solution by electroanalytical techniques	Analyze

CO – PO Mapping

S. No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	1	-	-	2	2	-	-	-	-	2
CO2	3	1	2	-	-	1	2	-	-	-	-	1
CO3	3	2	1	1	-	-	1	-	-	-	-	
CO4	2	1	2	-	-	2	2	-	-	-	-	
CO5	2	1	2	-	1	2	2	-	-	-	-	1
	2.6	1.3	1.6	1	1	1.4	1.8	-	-	-	-	1.3

SEMESTER II

S.NO.	COURSE CODE	COURSE NAME	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIOD	CREDITS
				L	T	P		
THEORY								
1.	PUCC2HM04	Professional English-II	HM	2	-	-	2	2
2.	PUCC2BS04	Statistics and Numerical Methods	BS	3	1	-	4	4
3.	PUCS2BS05	Physics for Information Science	BS	3	-	-	3	3
4.	PUCC2BE02	Basic Electrical & Electronics Engineering	BE	3	-	-	3	3
5.	PUCS2BE03	Fundamentals of Computer Science	BE	3	-	-	3	3
6.	PUCC2BE04	Problem Solving using Python Programming	BE	2	-	-	2	2
7.	PUCC2HM05	Tamils and Technology தமிழரும் தொழில்நுட்பமும்	HM	1	-	-	1	1
PRACTICALS								
8.	PUCC2PL03	Professional English - II	HM	-	-	4	4	2
9.	PUCC2PL04	Problem Solving using Python Programming	BS	-	-	4	4	2
10.	PUCC2PL05	Civil and Mechanical Engineering Practices	BE	-	-	2	2	1
11.	PUCC2PL06	Electrical and Electronics Engineering Practices	BE	-	-	2	2	1
12.	PUCC2HM06	Wellness	HM	-	-	1	1	0
		Total		17	1	13	31	24

PUCC2HM04	PROFESSIONAL ENGLISH - II	L T P C
		2 0 0 2

COURSE OBJECTIVE

- To engage learners in meaningful language activities to improve their reading and writing skills
- To help learners understand the purpose, audience, contexts of different types of writing
- To demonstrate an understanding of job applications and interviews for internship and placements

UNIT I: MAKING COMPARISONS 6

Reading - Reading advertisements, user manuals, brochures; Writing – Professional emails, Email etiquette - Compare and Contrast Essay; Grammar – Mixed Tenses, Prepositional phrases

UNIT II: EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING 6

Reading - Reading longer technical texts– Cause and Effect Essays, and Letters / emails of complaint, Writing - Writing responses to complaints. Grammar - Active Passive Voice transformations, Infinitive and Gerunds

UNIT III: PROBLEM SOLVING 6

Reading - Case Studies, excerpts from literary texts, news reports etc. Writing – Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay. Grammar – Error correction; If conditional sentences

UNIT IV: REPORTING OF EVENTS AND RESEARCH 6

Reading –Newspaper articles; Writing – Recommendations, Transcoding, Accident Report, Survey Report Grammar – Reported Speech, Modals

UNIT V: THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY 6

Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Grammar – Numerical adjectives, Relative Clauses.

TOTAL: 30 PERIODS

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

COs	Course Outcome (CO)	Blooms Taxonomy
CO-1	Compare and Contrast products and ideas in technical texts.	Apply
CO-2	Identify cause and effect in longer text for technical communication	Apply
CO-3	Analyze problems in order to ensure solutions in oral and written professional communication	Analyse
CO-4	Presenting oral and written Report of Events and Technical process	Apply
CO-5	Prepare job applications and resume	Apply

CO-PO Mapping

Course Outcomes	Programme Outcomes (POs)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	1	-	1	2	3	-	2
CO2	-	-	-	-	-	1	-	1	2	3	-	1
CO3	-	-	-	-	-	1	-	1	3	3	-	1
CO4	-	-	-	-	-	2	-	1	3	3	-	2
CO5	-	-	-	-	-	2	-	1	3	3	-	3

*For Entire Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO

TEXTBOOKS:

1. Elizabeth Tebeaux, Sam Dragga, The Essentials of Technical Communication, Oxford University Press, 2017
2. Raman. Meenakshi, Sharma. Sangeeta . Professional English. Oxford university press. New Delhi.2019.

REFERENCES:

1. Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University., English for Science & Technology Cambridge University Press 2021.
2. Kieran Morgan & Sanja Spajic, Technical Writing Process, Better On Paper Publications,2015.
3. Krishna Mohan, Meera Banerji, "Developing Communication Skills", Trinity Press, 2017.
4. Phillip, A. Laplante,Technical Writing: A Practical Guide for Engineers and Scientists , CRC Press; 2 edition,2018
5. Gerald J. Alred, Walter E. Oliu, Charles T. Brusaw, Handbook of Technical Writing, Bedford/St. Martin's; 12th edition,2018

WEBSITE REFERENCE:

1. IELTS : https://ieltstrainingonline.com/british-council-practice-ielts-reading-actual-tests/
2. http://www.englishdaily626.com/c-errors.php?010 (common errors)

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. https://nptel.ac.in/courses/109105144 (employment communication)
2. https://onlinecourses.nptel.ac.in/noc22_hs05/preview (effective Writing)
3 .https://www.slideshare.net/Punitayadav19/cv-writing-nptelpdf (resume Preparation)

PUCC2BS04		STATISTICS AND NUMERICAL METHODS	L T P C
			3 1 0 4

COURSE OBJECTIVE

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS	9+3

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes -Application: Real life problems in varies field.

UNIT II DESIGN OF EXPERIMENTS	9+3

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

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS	9+3

Solution of algebraic and transcendental equations – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting – Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION	9+3

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

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	9+3

Single step methods: Taylor's series method – Euler's method - Modified Euler's method – Fourth order Runge- Kutta method for solving first order differential equations - Multi step methods: Milne's predictor corrector methods for solving first order differential equations- Application of numerical solution of ordinary differential equations.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

	Course outcomes	Blooms Level
CO 1	Apply the concept of testing of hypothesis for small and large samples in real life problems.	Apply
CO2	Apply the basic concepts of classifications of design of experiments in the field of agriculture	Apply
CO 3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems	Evaluate
CO 4	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations	Understand
CO 5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications	Apply

CO – PO Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	-	-	-	-	-	-	-	1
CO2	3	3	2	2	-	-	-	-	-	-	-	1
CO3	3	3	2	3	-	-	-	-	-	-	-	1
CO4	3	3	2	2	-	-	-	-	-	-	-	1
CO5	3	3	2	-	-	-	-	-	-	-	-	1

TEXTBOOKS:
1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.46

REFERENCES:
1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
4. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

WEBSITE REFERENCE:
1. **https://learnengineering.in/ma3251-statistics-and-numerical-methods/ - Learn Engineering**
2. **https://lms.su.edu.pk/download?filename=1588490822-walpole-probability-statistics-for-engineers-scientists-9th-edition.pdf&lesson=15012 – Probability & Statistics for Engineers and Scientist**

NPTEL/ SWAYAM/ MOOC REFERENCE:

. 1. NPTEL: Introduction to testing Hypothesis, Prof.Arun, K Tangirala,IIT Madras
2. NPTEL: Numerical Methods , Prof. Ameeya kumar Nayak, Sanjeev Kumar -IIT Roorkee.
3. SWAYAM: Numerical Analysis, Prof. S. Baskar , IIT Bombay.

PUCS2BS05	PHYSICS FOR INFORMATION SCIENCE	L T P C
		3 0 0 3

COURSE OBJECTIVE

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

UNIT I:	ELECTRICAL PROPERTIES OF MATERIALS	9

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures - electrons in metals – Particle in a three-dimensional box – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole.

UNIT II:	SEMICONDUCTOR PHYSICS	9

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of 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 – Ohmic contacts – Schottky diode.

UNIT III:	MAGNETIC PROPERTIES OF MATERIALS	9

Magnetic dipole moment – atomic magnetic moments- magnetic permeability and susceptibility - Magnetic material classification: diamagnetism – paramagnetism – ferromagnetism – antiferromagnetism – ferrimagnetism – Ferromagnetism: origin and exchange interaction- saturation magnetization and Curie temperature – Domain Theory- M versus H behaviour – Hard and soft magnetic materials – examples and uses–- Magnetic principle in computer data storage – Magnetichard disc (GMR sensor).

UNIT IV:	OPTICAL PROPERTIES OF MATERIALS	9

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

UNIT V:	NANODEVICES AND QUANTUM COMPUTING	9

Introduction - quantum confinement – quantum structures: quantum wells, wires and dots –– band gap of nanomaterials. Tunneling – Single electron phenomena: Coulomb blockade - resonant- tunneling diode – single electron transistor – quantum cellular automata - Quantum system for information processing - quantum states – classical bits – quantum bits or qubits –CNOT gate - multiple qubits – Bloch sphere – quantum gates – advantage of quantum computing over classical computing.

TOTAL: 45 PERIODS

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

COs	Course outcomes	Blooms Level
CO 1	Comprehend the classical and quantum electron theories, and energy band structures	Understand
CO2	Illustrate the semiconductor physics and its applications in various devices	Understand
CO 3	Demonstrate magnetic properties of materials and their applications in data storage,	Apply
CO 4	Explain the functioning of optical materials for optoelectronics	Understand
CO 5	Comprehend the basics of quantum structures and their applications and basics of quantum computing	Understand

CO – PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	-	-	-	-	-	-	1
CO2	3	1	2	-	-	-	-	-	-	-	-	1
CO3	3	-	-	1	2	1	1	-	-	-	-	1
CO4	3	-	2	1	3	-	1	-	-	-	-	1
CO5	3	2	2	2	2	1	2	-	-	-	-	1

*For Entire Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO

TEXT BOOKS:

1. Jasprit Singh, "Semiconductor Devices: Basic Principles", Wiley (Indian Edition), 2007.
2. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw-Hill Education (IndianEdition), 2020.
3. Parag K. Lala, Quantum Computing: A Beginner's Introduction, McGraw-Hill Education (IndianEdition), 2020.

REFERENCES:

1. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
2. Y.B.Band and Y.Avishai, Quantum Mechanics with Applications to Nanotechnology and
3. Information Science, Academic Press, 2013.
4. V.V.Mitin, V.A. Kochelap and M.A.Stroscio, Introduction to Nanoelectronics, CambridgeUniv.Press, 2008.
5. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson Education (Indian Edition) 2009.
6. B.Rogers, J.Adams and S.Pennathur, Nanotechnology: Understanding Small Systems, CRCPress, 2014.

NPTEL/ SWAYAM/ WEBSITE REFERENCE:

1. https://onlinecourses.nptel.ac.in/noc19_cy35/preview - Chemical Crystallography by By Prof. Angshuman Roy Choudhury, IISER Mohali
2. https://archive.nptel.ac.in/courses/113/102/113102080/ -Introduction to Materials science and Engineering by Prof. Rajesh Prasad, IIT Delhi.
3. https://onlinecourses.nptel.ac.in/noc20_ph10/preview - Electronic Theory of Solids, by Prof. Arghya Taraphder, IIT Kharagpur

4. https://archive.nptel.ac.in/courses/117/108/117108047/ - Nano Devices & Electronics, by IISC Bangalore
5. https://onlinecourses.nptel.ac.in/noc22_ee47/preview - Physics of Nanoscale Devices, By Prof. Vishvendra Singh Poonia, IIT Roorkee

PUCC2BE02	Basic Electrical and Electronics Engineering	L T P C
		3 0 0 3

COURSE OBJECTIVE

- To introduce the basics of electric circuits and analysis
- To impart knowledge in the basics of working principles and application of electrical machines
- To introduce analog devices and their characteristics
- To educate on the fundamental concepts of digital electronics
- To introduce the functional elements and working of measuring instruments

UNIT I - DC CIRCUITS   9

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws –Independent– Simple problems- Nodal Analysis, Mesh analysis with Independent sources only (Steady state)

UNIT II - AC CIRCUITS   9

Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only) Operating Principle of single phase Energy Meter

UNIT III - ELECTRICAL MACHINES   9

Construction and Working principle - DC Generator & DC motor. Types and Applications. Transformer- Construction, Working principle and Applications, Working principle of Stepper Motor and Single phase, induction Motors

UNIT IV - ANALOG ELECTRONICS   9

Semiconductor Materials: Silicon &Germanium – PN Junction Diodes, Zener Diode –Characteristics Applications – Bipolar Junction Transistor, MOSFET, SCR I-V Characteristics and Applications, Rectifier

UNIT V - DIGITAL ELECTRONICS   9

Review of number systems, Binary codes, Logic gates, Boolean algebra, Half Adder & Full Adder, Multiplexer & De-Multiplexer, Encoder & Decoder. (Qualitative Treatment only)

TOTAL: 45 PERIODS

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

COs	Course Outcomes	Blooms level
CO1	Understand the basic knowledge in DC circuits with passive components	Understanding
CO2	Understand the basic knowledge in AC circuits	Understanding
CO3	Explain the working principle and applications of electrical machines	Remembering
CO4	Analyze the characteristics of analog electronic devices	Analyzing
CO5	Explain the basic concepts of digital electronics	Remembering

RE(CSE)

CO – PO Mapping

Course Outcomes	Programme Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	2	2	1	-	-	-	-	1	-	-	-	2
CO 2	2	2	1	-	-	-	-	1	-	-	-	2
CO 3	2	1	1	-	-	-	-	1	-	-	-	2
CO 4	2	2	1	-	-	-	-	1	-	-	-	2
CO 5	2	2	1	-	-	-	-	1	-	-	-	2

TEXT BOOKS:

1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020

2. S.K.Bhattacharya "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2017.

REFERENCES:

1.James A .Svoboda, Richard C. Dorf, "Dorf's Introduction to Electric Circuits", Wiley, 2018.
2. Sedha R.S., "A textbook book of Applied Electronics", S. Chand & Co., 2018

WEBSITE REFERENCE:

1. https://www.electricaleasy.com/
2. https://easyengineering.net/be3251-basic-electrical-and-electronics-engineering-notes

NPTEL/ SWAYAM/ MOOC REFERENCE:

NPTEL: https://nptel.ac.in/courses/117106108 - Basic Electrical Circuits

BE (CSE) ∟

PUCS2BE03	FUNDAMENTALS OF COMPUTER SCIENCE	L T P C
		3 0 0 3

COURSE OBJECTIVE

•To understand the basic hardware and software components of a computing system
•To manipulate the flow of Program-Input-Processing-Output
•To introduce computational concepts by solving different problems
•To understand High Level computational algorithms and its executions.

UNIT I: BASIC HARDWARE SYSTEMS	9

Hardware: Building blocks of Computer-Types of Memory-CPU-Boolean Logic – Gates-Boolean Arithmetic- Calculations-Memory- Devices-Sequential Logic- Implementation- Simulations of Hardware.

UNIT II OS AND SOFTWARE	9

Operating System- memory management-Software: Compilations-Virtual Machine-Stack Machine-Memory Segments-Emulators-Branching and Functions-High Level Language- Compiler- Syntax Analysis- Code Generation.

UNIT III – INTRODUCTION TO COMPUTATIONAL THINKING	9

Computational Thinking – Logical Thinking – Algorithmic Thinking – Problem solving and Decomposition –Defining, Devising, Decomposition-strategies. Iterator - Variables

UNIT IV – PROBLEM SOLVING METHODS	9

Filtering - Data Types – Basic Data Types- Compound Data Types-Transformation of Data- Dynamic Conditions - Maximum and Minimum.

UNIT - V: PROCEDURES AND PARAMETERS	9

Pseudocode: Basic Iterations – Sequence Iteration- Nested Iterations-Sort: Insertion sort.

TOTAL: 45 PERIODS

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

CO'S	COURSE OUTCOMES	Blooms level
CO1	Trace the fundamentals of Hardware and its architecture.	Understanding
CO2	Virtualize any environment through software and know its memory management.	Applying
CO3	Develop computational thinking by solving problems.	Applying
CO4	Define flow of data and problem solving algorithmic approaches.	Understanding
CO5	Understand Parameters and Construct Pesudocode for Iterative Problems.	Analyzing

RF (CSE) ht

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	3	–	–	–	2	2	–	1	1	1
CO2	3	2	2	1	3	–	–	–	2	2	–	1	2	2
CO3	3	3	3	3	1	–	–	–	2	2	–	1	2	2
CO4	2	1	2	3	3	–	–	–	2	2	–	1	3	3
CO5	3	3	3	3	3	–	–	–	2	2	–	1	2	2

TEXT BOOK:

1. Noam Nisan, Shimon Schocken, "The Elements of Computing System: Building a Modern Computer from First Principles", MIT Press,Edition-2, 2021 .
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", First Edition, Notion Press, 2021.

REFERENCES:

1. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and programming", First Edition, BCS Learning & Development Limited, 2017.
2. Peter J Denning, Matti Tedre, "Computational Thinking", The MIT Press, 2019.
3. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2017.
4. Peter William Mcowan, Paul Curzon, "Power of Computational Thinking, The: Games, Magic And Puzzles To You Become A Computational Thinker ", World Scientific Europe Ltd, 2017
5. Thomas Mailund, "Introduction to Computational Thinking: Problem Solving, Algorithms, Data Structures, and More", Apress, USA, 2021.

WEBSITE REFERENCE:

1. http://vlabs.iitkgp.ernet.in/coa/

2. https://teach-sim.com/

3. https://cpulator.01xz.net/

NPTEL/ SWAYAM/ MOOC REFERENCE:

1.NPTEL Course "Computer Organization, IIT Madras   https://nptel.ac.in/courses/106106092

2."Fundamentals of Computing Specialization" course at Coursera.
https://www.coursera.org/specializations/computer-fundamentals

RF(CSE)

PUCC2BE04	PROBLEM SOLVING USING PYTHON PROGRAMMING	L T P C
		2 0 0 2

COURSE OBJECTIVE

- **The objective of this course is to familiarize the students with to know the design of algorithm and efficiency, to understand variables, expressions and statements, to explore flow of data and its executions, to study the compound data types, to know about class and objects in python.**

UNIT I:- COMPUTER-PROBLEM-SOLVING	6

Introduction: Top Down Design, Implementation of Algorithms, Program verification, Efficiency of algorithms.

UNITII:-DATA-TYPES, EXPRESSIONS, STATEMENTS	6

Python interpreter and interactive mode, debugging; values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments, Errors.

UNIT III - CONTROL FLOW, FUNCTIONS, STRINGS	6

Conditionals: Boolean values and operators, conditional, chained conditional ; Iteration: while, for, break, continue, pass, Random Number Generation; Functions: return values, parameters, local and global scope, function composition, recursion; Strings: slices, immutability, functions and methods, module.

UNIT IV - LISTS, TUPLES, DICTIONARIES	6

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension; Illustrative programs: Word histogram, Most Common Words, Word Frequency analysis.

UNIT - V: FILES, MODULES, PACKAGES	6

Files and Exceptions : text files, reading and writing files, errors and exceptions, handling exceptions, Pickling; Modules & Packages- Writing a Module- Library Files-Numpy-Pandas

	TOTAL: 30 PERIODS

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

COs	Course Outcomes	Blooms level
CO1	Identify Computer problems with its algorithmic design and solutions.	Remembering
CO2	Illustrate simple Python data types, Expressions and Operators.	Remembering
CO3	Execute simple Python programs using conditionals, looping statement and Functions for solving problems.	Applying
CO4	Identify Compound Data Types using List, Tuple and Dictionaries Python programs.	Applying
CO5	Infer the Object Oriented Concepts.	Remembering

CO – PO Mapping

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	1	-	-	1	2	2	-	-	2	2
CO2	3	3	3	2	3	-	-	1	2	2	-	-	3	2
CO3	3	3	3	2	3	-	-	1	2	2	-	-	3	2
CO4	3	3	3	2	3	-	-	1	2	2	-	-	3	2
CO5	3	3	3	2	3	-	-	1	2	2	-	-	3	2

TEXT BOOK:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.

REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and MadhavanMukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition,Notion-Press,2021.
3. John V Guttag,"Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data'', Third Edition, MIT Press.
4. Eric Matthes, "Python Crash Course, A Hands – on Project Based Introduction to Programming", 2nd Edition, No Starch-Press,2019.
5. R.G.Dromey,"How to solve it by Computer",Pearson India 2007

WEBSITE REFERENCE:

1. https://www.vlab.co.in/broad-area-computer-science-and-engineering
2. "Python for Everybody" at Coursera Online Courses.
   https://www.coursera.org/courses?query=python%20for%20beginners

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. The Joy of Computing using Python, IIT Ropar ,Prof. SudarshanIyengar

   NPTEL Courses.

   https://onlinecourses.nptel.ac.in/noc21_cs32/preview

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PUCC2HM05	TAMILS AND TECHNOLOGY	LTPC
		1 0 0 1

UNIT I:	WEAVING AND CERAMIC TECHNOLOGY	3

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

UNIT II:	DESIGN AND CONSTRUCTION TECHNOLOGY	3

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

UNIT III:	MANUFACTURING TECHNOLOGY	3

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

UNIT IV:	AGRICULTURE AND IRRIGATION TECHNOLOGY	3

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

UNIT V:	SCIENTIFIC TAMIL & TAMIL COMPUTING	3

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

TOTAL: 15 PERIODS

TEXT-CUM-REFERENCE BOOK:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் –
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்)வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும்
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by: International\ statute 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) – Refernece Book.

BE (CSE) 20

PUCC2PL03			L T P C
PROFESSIONAL ENGLISH – II LABORATORY			0 0 4 2

COURSE OBJECTIVE

- To identify varied group discussion skills and apply them to take part in effective discussions in a professional context.
- To analyse concepts and problems and make effective presentations explaining them clearly and precisely.
- To be able to use appropriate language structures to write emails, reports and essays

LIST OF ACTIVITIES

T – I		12

	Activity 1	Reading Advertisement and Group activity
	Activity 2	Writing Professional Emails
	Activity 3	Group activity : create simple user manuals
	Activity 4	writing compare and contrast essay

T – II		12

	Activity 1	Reading longer text and identify the main ideas
	Activity 2	Writing cause and effect essay
	Activity 3	Reading complaint letter
	Activity 4	Writing Responding letter

UNIT – III		12

	Activity 1	Reading Case Studies
	Activity 2	Discussion and presentation on Case studies
	Activity 3	Excerpts from literary texts or news reports
	Activity 4	Group Activity : Create simple News report

UNIT – IV		12

	Activity 1	Reading Article from newspaper
	Activity 2	Group Activity :Writing article
	Activity 4	Reading types of reports
	Activity 4	pair activity : writing Survey / Accident Report

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UNIT – V			12
	Activity 1	Reading company profile	
	Activity 2	Role play activity – Create company profile	
	Activity 3	Reading Types of Resume	
	Activity 4	Create Cover letter and resume	

TOTAL: 60 PERIODS

COURSE OUTCOMES: **Blooms level**

COs	At the end of the course students can able to	Blooms Taxonomy
CO-1	Write professional emails	Apply
CO-2	Prepare complaint and responding letter	Apply
CO-3	Discuss and analyse problems from various perspectives to arrive solutions	Analyse
CO-4	Write short articles with precision	Apply
CO-5	Create company profile	Apply

CO – PO Mapping

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	1	-	1	3	3	-	3
CO2	-	-	-	-	-	2	-	2	3	3	-	3
CO3	-	-	-	-	-	2	-	2	3	3	-	3
CO4	-	-	-	-	-	2	-	1	3	3	-	2
CO5	-	-	-	-	-	3	-	1	3	3	-	3

TEXT BOOK:
1. Department of English, Anna University, English for Engineers & Technologists, Orient Blackswan, 2021,
2. Cambridge University Press, English for Science & Technology, 2021.

REFERENCE:

1. Raman. Meenakshi, Sharma. Sangeeta , Professional English, Oxford university press.New Delhi.2019
2. Stella Cortrell , Red Globe Press, "The Study Skills Handbook" , 2019
3. Mathew Richardson , Charlie Creative Lab ,"Advanced Communication Skills" , 2020.
4. Jack C.Richards , "Interchange", Cambridge University Press , Fifth Edition, 2017
5. Mathew Richardson, Charlie Creative Lab ,"Advanced Communication Skills" , 2020

RF (CSE)

PUCC2PL04 PROBLEM SOLVING USING PYTHON PROGRAMMING LAB	L T P C
	0 0 4 2

COURSE OBJECTIVE

- The objective of this course is to familiarize the students with to know the design of algorithm and efficiency, to understand variables, expressions and statements, to explore flow of data and its executions, to study the compound data types, to know about class and objects in python.

LIST OF EXERCISES

1. Use Linux shell commands, use Python in interactive mode, and an editor

    a. os.system()
    b. subprocess.run()
    c. subprocess.Popen()
    d. os.utime()

2. Write simple python programs for

    a. Area of a geometric shape
    b. Simple interest
    c. Solve quadratic equation
    d. Netsalary

3. Write programs using conditional statements for

    a. Leap year
    b. Simple calculator
    c. Grade of the total mark

4. Develop programs using loops and nested loops for

    a. Multiplication table
    b. Sum of a series
    c. Print patterns

5. Develop programs using functions for

    a. Sine and cosine series
    b. Pythagorean triplets

6. Develop programs using recursion for

    a. Efficient power of a number
    b. Factorial
    c. Fibonacci number

7. Develop programs using strings for

    a. Palindrome
    b. Finding substring

8. Develop programs using lists and tuples
    a. linear search
    b. binary search
    c. selection sort
    d. insertion sort
    e. Quicksort

09. Develop matrix manipulations programs using nested lists.
10. Develop simple programs using dictionaries

     a.   frequency histogram
     b.   nested dictionary
11. Develop programs using Files.

     a.   read files
     b.   write files
12. Develop programs to perform any task by reading arguments from command line.
13. Implement a simple application using appropriate datatypes and files

Total Periods: 60

COURSE OUTCOMES:

                                                                        Blooms level

CO		Blooms level
CO1	Execute simple Python data types, Expressions and Operators.	Apply
CO2	Write simple Python programs using conditionals, looping statement and Functions for solving problems.	Apply
CO3	Represent Compound Data Types using List, Tuple and Dictionaries Python programs.	Apply
CO4	Read and write data from/to files in Python programs and Object Oriented Concepts.	Apply
CO5	Implement a simple application using appropriate datatypes and files	Apply

CO – PO Mapping

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	1	3	–	–	–	3	–	–	–	3	1
CO2	2	3	3	1	3	–	–	–	3	–	–	–	3	1
CO3	2	3	3	1	3	–	–	–	3	–	–	–	3	1
CO4	2	3	3	1	3	–	–	–	3	–	–	–	3	1
CO5	2	3	3	1	3	–	–	–	3	–	–	–	3	1

TEXT BOOK:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.

REFERENCES:

2. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
3. G Venkatesh and MadhavanMukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition,Notion-Press,2021.
4. John V Guttag,"Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press.
5. Eric Matthes, "Python Crash Course, A Hands – on Project Based Introduction to Programming", 2nd Edition, No Starch-Press,2019.
6. R.G.Dromey,"How to solve it by Computer", Pearson India 2007

WEBSITE REFERENCE:

1. https://www.vlab.co.in/broad-area-computer-science-and-engineering

2. "Python for Everybody" at Coursera Online Courses.

https://www.coursera.org/courses?query=python%20for%20beginners

NPTEL/ SWAYAM/ MOOC REFERENCE:

1 The Joy of Computing using Python, IIT Ropar ,Prof. SudarshanIyengar

NPTEL Courses.

2.https://onlinecourses.nptel.ac.in/noc21_cs32/preview

PUCC2PL05	CIVIL AND MECHANICAL ENGINEERING PRACTICES LABORATORY	L T P C
		0 0 2 1

COURSE OBJECTIVE

- Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planning; making joints in wood materials used in common house hold wood work.

- Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts;

- Assembling simple mechanical assembly of common household equipment's; Making a tray out of metal sheet using sheet metal work

GROUP – A	CIVIL PRACTICE	12

PLUMBING WORK:

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.

b) Preparing plumbing line sketches.

c) Laying pipe connection to the suction side of a pump

d) Laying pipe connection to the delivery side of a pump.

e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in house hold appliances.

WOOD WORK:

a) Sawing,

b) Planning and

c) Making joints like T-Joint,

d) Mortise joint

e) Tenon joint and Dovetail joint.

Wood Work Study:

a) Studying joints in door panels and wooden furniture

b) Studying common industrial trusses using models.
c)

GROUP - B	MECHANICAL PRACTICES	18

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.

b) Practicing gas welding.

BASIC MACHINING WORK:

a) Simple Turning.

b) Simple Drilling.

c) Simple Tapping.

d) Simple Grinding

ASSEMBLY WORK:

a) Assembling a centrifugal pump.

b) Assembling a household mixer.

c) Assembling an air conditioner.

SHEET METAL WORK:

a) Making of a square tray and Rectangle tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations.

(b) Smithy operations, upsetting, swaging, setting down and bending. Example –

Exercise – Production of hexagonal headed bolt.

(c) Fitting – Exercises – Preparation of square fitting and V – fitting models.

	TOTAL: 30 PERIODS

COURSE OUTCOMES On successful completion of this course, the student will be able to.	
CO1	Draw pipe line plan; lay and connect various pipe fittings used in common household Plumbing work.
CO2	Make joints in wood materials used in common household wood work.
CO3	Perform various machining operation in a lathe, drilling and Milling.
CO4	Perform the various welding processes and know about its applications.
CO5	Demonstrate the various foundry and fitting Exercises and know about its applications.

	TEXT BOOKS/REFERENCE BOOKS:	
1	Willis H. Wagner, Howard "Bud" Smith, and Mark W. Huth Modern Carpentry, 12th Edition, 2015	
2	P.C.Sharma, Production Technology (Manufacturing Process): Manufacturing Process, S.Chand publisher, 2006	
3	Robert W. Messler, Reverse Engineering: Mechanisms, Structures, Systems & Materials, McGraw-Hill Education, 2014	
4	K.Jeyachandran, S.Natarajan& S, Balasubramanian, "A Primer on Engineering Practices Laboratory", Anuradha Publications, (2007).	
6	Steam Generators and Waste Heat Boilers: For Process and Plant Engineers (Mechanical Engineering) by V. Ganapathy	

CO-PO MAPPING

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	2	-	1	-	-	-	-	-	-	2	2	1
CO2	3	-	3	-	2	-	-	-	-	-	-	1	2	2
CO3	3	1	1	-	2	1	1	1	-	-	-	3	2	2
CO4	3	1	2	-	3	1	1	1	1	-	-	3	2	2
CO5	3	-	1	1	2	-	-	-	-	-	-	2	2	2

SEMESTER III

S.NO.	COURSE CODE	COURSE NAME	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	PUCS3BS06	Mathematics for Computer Science and Engineering	BS	3	1	-	4	4
2.	PUCS3PC01	Computer Organization and Architecture	PC	3	1	-	4	4
3.	PUCS3PC02	Foundations of Data Science	PC	3	-	-	3	3
4.	PUCS3PC03	Data Structures and Algorithms	PC	3	-	2	5	4
5.	PUCS3PC04	Object Oriented Programming	PC	3	-	-	3	3
6.	PUCC3MCXX	Mandatory Course – I (Non-Credit)	MC	2	-	-	2	0
PRACTICALS								
7.	PUCS3PL01	Data Science Laboratory	PC	-	-	4	4	2
8.	PUCS3PL02	Object Oriented Programming Laboratory	PC	-	-	4	4	2
9.	PUCC3HM07	Extension Activities	HM	-	-	1	1	0
		Total		17	1	11	29	22

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PUCS3BS06	MATHEMATICS FOR COMPUTER SCIENCE AND ENGINEERING	L T P C
		3 1 0 4

COURSE OBJECTIVE

- Apply the concepts of probability, random variable and their properties to generate the moments.
- To introduce Mathematical Logic, Inference Theory and proof methods.
- To introduce partial ordering and some functions on a set.
- To introduce graph models, their representation, connectivity and traverse ability.
- Able to demonstrate their knowledge of algorithms by solving concrete problems.

UNIT I -	PROBABILITY AND RANDOM VARIABLES	9+3

Probability - Axioms of probability - Conditional probability - Baye's theorem - Random variables - One dimensional random variable (Discrete and continuous) - Probability mass function, probability density function, moments, moment generating function.

UNIT-II	MATHEMATICAL LOGIC	9+3

Propositional Logic - Propositional Equivalences - Normal Forms - Predicates and Quantifiers- Rules of Inference - Introduction to Proofs - Proof Methods and Strategy.

UNIT III	SETS AND FUNCTIONS	9+3

Set - Relations on sets - Types of relations - Partitions - Equivalence relations - Partial ordering- Poset – Hasse diagram. Functions: Characteristic function of a set - Hashing functions - Recursive functions - Permutation functions.

UNIT IV	GRAPH THEORY	9+3

Graphs and Graph Models - Graph Terminology and Special Types of Graphs - Matrix Representation of Graphs and Graph Isomorphism - Connectivity - Euler and Hamilton Paths.

UNIT V	NETWORK FLOW AND COLORING	9+3

Kruskal's and Prim's Algorithm - Shortest path algorithm - Dijkstra's algorithm - Max-flow/Min-cut Theorem - Chromatic number - Chromatic Partitioning - Chromatic Polynomial – Matching - Covering- four colour problems.

TOTAL: 60 PERIODS

COURSE OUTCOMS	Upon completion of this course, the student will be able to	Cognitive Level
CO1	Understand the fundamental knowledge of the concepts of probability	Understand
CO2	Construct proofs by using direct proof, Construct mathematical arguments using logical connectives and quantifiers and verify the correctness of an argument using propositions. Logic helps in arriving inferences for any problem.	Apply
CO3	Understand relations on a set and functions on a set.	Understand
CO4	Apply the concepts of graph theory in data structures, data mining and image segmentation and in clustering.	Apply
CO5	Implement a variety of practical problems in network analysis.	Apply

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CO – PO Mapping

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

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

TEXTBOOK:
- Ibe,O.C.," Fundamentals of Applied Probability and Random Processes ", 2nd Edition, Academic press, 2019.
- Tremblay J.P. and Manohar R, Discrete Mathematical Structures with Applications to Computer Science‖, Tata McGraw Hill Pub. Co. Ltd, Thirtieth Reprint, New Delhi, 2017.

REFERENCES:
- Peebles, P.Z., "Probability, Random Variables and Random Signal Principles ", 4th Edition, New Delhi, McGraw Hill Education, 2017.
- T. Veerarajan, "Probability, Statistics and Random Processes with Queueing Theory and Queueing Networks", McGraw Hill Publishers, 4th Edition, 7th Reprint, 2018
- Ralph. P. Grimaldi, Discrete and Combinatorial Mathematics: An Applied Introduction‖, Pearson Education, Fifth Edition, New Delhi, 2014
- Seymour Lipschutz and Mark Lipson, Discrete Mathematics, Schaums Outlines, Tata McGraw Hill Pub. Co. Ltd., Third Edition, New Delhi, 2013.
- Thomas Koshy, Discrete Mathematics with Applications‖, Elsevier Publications, Boston, 2004.

NPTEL/ SWAYAM/ MOOC REFERENCE:

Probability :	https://nptel.ac.in/courses/111102111/
	https://nptel.ac.in/courses/111/104/111104032/
Sets and Graph Theory :	https://archive.nptel.ac.in/courses/111/106/111106086/
	https://archive.nptel.ac.in/courses/111/106/111106052/
	https://archive.nptel.ac.in/courses/111/106/111106158/
Logic, proof :	https://www.youtube.com/watch?v=NxV9P8EzdOI

PUCS3PC01	COMPUTER ORGANIZATION AND ARCHITECTURE	L T P C
		3 1 0 4

COURSE OBJECTIVE

- To make students understand the basic structure and operation of digital computer.
- To explore the hardware-software interface.
- To familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
- To familiarize the students with hierarchical memory system including cache memories and virtual memory.
- To expose the students with different ways of communicating with I/O devices and standard I/O

UNIT I:- INTRODUCTION   9+3

Components of a computer system – Technology – Performance – Bus structures – Interface circuits - Serial communication links. Uni -processors to multiprocessors; Instructions – operations and operands – Representing instructions– Basic I/O operations – Addressing and addressing modes.

UNITII:- ARITHMETIC OPERATIONS   9+3

ALU - Arithmetic - Addition & subtraction of signed numbers - Multiplication - Integer division - Floating point operations

UNIT III -PROCESSOR AND CONTROL   9+3

Processing unit - Control unit - Pipelining -Multiple bus organization - Hardwired control - Micro programmed control - Hazards - Data path - Embedded systems.

UNIT IV - PARALLELISM   9+3

Memory system - Basic concepts - Semiconductor RAM memory - Cache memory - Level-parallelism – Parallel processing challenges – Flynn's classification – Hardware multithreading – Multicore processors- Virtual memory. Input/output system programmed I/O.

UNIT - V: I/O SYSTEMS   9+3

I/O Organization - Accessing I/O devices - Interrupts -Input/output system, programmed I/O, DMA and Interrupts- I/O processors Stack organization.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO'S	COURSE OUTCOMES	COGNITIVE LEVEL
CO1	Identify basic components of computer system.	Understand
CO2	Interpret arithmetic and logic unit	Understand
CO3	Describe the performance of processors.	Understand
CO4	Illustrate parallel processing architectures.	Apply
CO5	Classify the I/O systems and Interrupts.	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	–	–	–	–	1	1	2	2	2	2
CO2	3	2	3	2	–	–	–	–	1	1	2	2	2	2
CO3	3	2	3	2	–	–	–	–	1	1	2	2	2	2
CO4	3	2	3	2	–	–	–	–	1	1	2	2	2	2
CO5	3	2	3	2	–	–	–	–	1	1	2	2	2	2

TEXT BOOK:

1. David A. Patterson and John L. Hennessey, "Computer organization and design", Morgan Kauffman / Elsevier, Fifth edition, 2014.
2. M.Morris Mano," Computer System Architecture", 3rd edition,2017.

REFERENCES:

1. V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, "Computer Organisation",
VI th edition, Mc Graw-Hill Inc, 2012.

2. William Stallings "Computer Organization and Architecture" , Seventh Edition , Pearson Education, 2006.

3. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.

4. Govindarajalu, "Computer Architecture and Organization, Design Principles and Applications", first edition, Tata McGraw Hill, New Delhi, 2005.

5. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata Mc Graw Hill, 1998.

NPTEL

https://.nptel.ac.in/Computer_architecture

PUCS3PC02	FOUNDATIONS OF DATA SCIENCE	L T P C
		3 0 0 3

COURSE OBJECTIVE

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

UNIT I: INTRODUCTION	9

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

UNIT II: DESCRIBING DATA	9

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

UNIT III: DESCRIBING RELATIONSHIPS	9

Correlation –Scatter plots –correlation coefficient for quantitative data –computational formula for correlation coefficient – Regression –regression line –least squares regression line – Standard error of estimate – interpretation of r2 –multiple regression equations –regression towards the mean

UNIT IV: PYTHON LIBRARIES FOR DATA WRANGLING	9

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

UNIT - V: DATA VISUALIZATION	9

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

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO'S	COURSE OUTCOMES	COGNITIVE LEVEL
CO1	Describe the data science process	Understand
CO2	Interpret different types of data description for data science process	Understand
CO3	Demonstrate relationship between data using correlation methods	Apply
CO4	Implement Data Wrangling using the Python Libraries	Apply
CO5	Apply visualization Libraries in Python to interpret and explore data	Apply

BE (CSE) 6!

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	-	-	-	-	-	1	1	-	1	1	1
CO2	3	2	1	1	-	-	-	-	1	1	-	1	1	2
CO3	3	2	2	2	1	-	-	-	1	1	1	1	2	2
CO4	3	2	2	2	1	-	-	-	1	1	1	1	2	2
CO5	3	3	2	2	2	-	-	-	1	1	1	1	2	2

TEXTBOOK:

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016. (Unit I)

2. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017. (Units II and III)

REFERENCES:

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

2. Jake VanderPlas, "Python Data Science Handbook", O'Reilly, 2016. (Units IV and V)

NPTEL

1. https://.nptel.ac.in/Data Science for Engineers

2. https://nptel.ac.in/Python for Data Science

BE(CSE)bb

PUCS3PC03	DATA STRUCTURES AND ALGORITHMS	L T P C
		3 0 2 4

COURSE OBJECTIVE

- To understand the concepts of ADTs
- To design linear data structures – lists, stacks, and queues
- To understand sorting, searching, and hashing algorithms
- To apply Tree and Graph structures

UNIT I LINEAR STRUCTURES	9

Abstract Data Types (ADTs) - List ADT – array-based implementations – linked list implementations – singly linked lists – circularly linked lists – doubly linked lists – Stack ADT – Queue ADT – double ended queues – applications

UNIT II TREE STRUCTURES	9

Tree ADT – Binary Tree ADT – tree traversals – binary search trees – AVL trees – heaps – multiway search trees

UNIT III GRAPH STRUCTURES	9

Graph ADT – representations of graph – graph traversals – DAG – topological ordering – greedy algorithms – dynamic programming – shortest paths: Dijkstra's algorithm - minimum spanning trees – introduction to complexity classes and intractability.

UNIT IV ALGORITHM ANALYSIS	9

Introduction to analysis of algorithms – asymptotic notations –Worst case and average case analysis - divide & conquer – recursion – Analyze recursive algorithms.

UNIT V SORTING AND SEARCHING	9

Bubble sort – selection sort – insertion sort – merge sort – quick sort – analysis of sorting algorithms – linear search – binary search – hashing – hash functions – collision handling – load factors, rehashing, and efficiency

45 PERIODS

PRACTICAL EXERCISES
1. Linked list implementation of Stack and Queue ADTs.
2. Linked list implementation of Queue ADTs.
3. Implementation of Binary Search Trees
4. Implementation of AVL Trees
5. Implementation of Dijkstra's Algorithm
6. Implementation of Prim's Algorithm
7. Implementation of Linear Search and Binary Search. Determine the time required to search for an element. Repeat the experiment for different values of n, the number of elements in the list to be searched and plot a graph of the time taken versus n.
8. Implementation of Binary Search. Determine the time required to search for an element. Repeat the experiment for different values of n, the number of elements in the list to be searched and plot a graph of the time taken versus n.
9. Implementation of Insertion Sort. Determine the time required to sort the elements.
10. Implementation of Selection Sort. Determine the time required to sort the elements.

30 PERIODS
TOTAL:75 PRIODS

BE (CSE) 6

COURSE OUTCOMES:

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

CO'S	COURSE OUTCOMES	COGNITIVE LEVEL
CO1	Illustrate the fundamentals of abstract data types.	Understand
CO2	Implement data structures, such as lists, queues, and stacks, according to the needs of different applications	Apply
CO3	Select appropriate data structures to solve problems such as searching, indexing, and sorting.	Analyze
CO4	Implement efficient tree structures.	Understand
CO5	Implement efficient graph algorithms to solve real time problems.	Apply

CO – PO Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	1	-	-	-	1	1	-	1	1	1
CO2	3	2	2	1	1	-	-	-	1	1	-	1	2	2
CO3	3	2	2	1	1	-	-	-	1	1	-	1	2	2
CO4	3	2	2	1	1	-	-	-	1	1	-	1	2	2
CO5	3	3	2	1	1	-	-	-	1	1	-	1	2	2

TEXT BOOK:

1. Michael T. Goodrich, Roberto Tamassia, and Michael H. Goldwasser, "Data Structures & Algorithms in Python", An Indian Adaptation, John Wiley & Sons Inc., 2021.

REFERENCES:

1. Lee, Kent D., Hubbard, Steve, "Data Structures and Algorithms with Python" Springer Edition 2015
2. Rance D. Necaise, "Data Structures and Algorithms Using Python", John Wiley & Sons, 2011
3. Aho, Hopcroft, and Ullman, "Data Structures and Algorithms", Pearson Education, 1983.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, "Introduction to Algorithms", Second Edition, McGraw Hill, 2002.
5. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Fourth Edition, Pearson Education, 2014.

NPTEL

1. https://nptel.ac.in/ Data Structures

PUCS3PC04	OBJECT ORIENTED PROGRAMMING	L T P C
		3 0 0 3

COURSE OBJECTIVE

- To impart the core language features of Java and its Application Programming Interfaces(API)
- To demonstrate the use of threads, exceptions, files and collection frameworks in Java.
- To familiarize the GUI based application development

UNIT I INTRODUCTION TO OOP AND JAVA 9

Java Basics: Java Design goal - Features of Java Language - JVM - Bytecode - Java source filestructure-basic programming constructs- Arrays- one dimensional and multi-dimensional enhanced for loop

UNIT II INHERITANCE, PACKAGES AND INTERFACES 9

Class Fundamentals - Object reference array of objects constructors methods over- loading this reference static block - nested class inner class ,Inheritance types – use of super - Polymorphism abstract class interfaces packages and sub packages.

UNIT III EXCEPTION HANDLING AND MULTITHREADING 9

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

UNIT IV I/O, GENERICS, STRING HANDLING 9

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

UNIT - V: GUI Programming 9

GUI programming using JavaFX, exploring events, controls and JavaFX menus. Layouts – FlowPane – HBox and VBox – BorderPane – StackPane – GridPane

TOTAL: 45 PERIODS

COURSE OUTCOMES:
At the end of the course, Students will be able to

CO'S	COURSE OUTCOMES	COGNITIVE LEVEL
CO1	Comprehend Java Virtual Machine architecture and Java Programming	Apply
CO2	Implement applications involving Object Oriented Programming concepts such	Apply
CO3	Build multi-threaded Java Applications.	Apply
CO4	Build software using concepts such as files, Generics.	Apply
CO5	Design Graphical User Interface using JavaFX	Apply

RF(CSE)

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	1	-	-	-	2	1	-	1	2	2
CO2	3	3	3	2	2	-	-	-	2	1	-	1	3	2
CO3	3	3	3	2	2	-	-	-	2	1	-	1	3	2
CO4	3	3	3	2	2	-	-	-	2	1	-	1	3	2
CO5	3	3	3	2	2	-	-	-	2	1	-	1	3	2

TEXT BOOK:

1. Hserbert Schildt, The Complete Reference -Java, Tata McGraw-Hill Education, Tenth Edition, 2017.
2. Y. Daniel Liang, Introduction to Java programming-comprehensive version-Tenth Edition,Pearson ltd 2015

REFERENCES:

1. Paul J. Deitel, Harvey Deitel, J a v a SE8 for Programmers (Deitel Developer Series) 3rd Edition, 2014.
2. Paul Deitel Harvey Deitel, Java, How to Program, Prentice Hall, 9th edition , 2011.
3. Cay Horstmann BIG JAVA, 4th edition, John Wiley Sons,2009

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. https://onlinecourses.nptel.ac.in/Object_Oriented_Programming

RF(CSF)6S

PUCS3PL01	DATA SCIENCE LABORATORY	L T P C
		0 0 4 2

COURSE OBJECTIVE

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

LIST OF EXERCISES

1. Download, install, and explore the features of NumPy, SciPy, Jupyter, Statsmodels, and Pandas Packages.

2. Working with Numpy arrays

3. Read the following file formats using pandas
   a. Text files
   b. CSV files
   c. Excel files
   d. JSON files

4. Working with Pandas data frames

5. Reading data from text files, Excel, and the web and exploring various commands for doing descriptive analytics on the Iris data set.

6. Use the diabetes data set from UCI and Pima Indians Diabetes data set for performing the Following Univariate analysis: Frequency, Mean, Median, Mode, Variance, Standard Deviation, Skewness and Kurtosis.

7. Use the diabetes data set from UCI and Pima Indians Diabetes data set for performing the Following Bivariate analysis: Linear and logistic regression modeling, Multiple Regression analysis, Also compare the results of the above analysis for the two data sets.

8. Apply and explore various plotting functions on UCI data sets.
   a. Normal curves
   b. Density and contour plots
   c. Correlation and scatter plots
   d. Histograms
   e. Three-dimensional plotting

9. Visualizing Geographic Data with Basemap.

Total Periods: 60

BE(CSE)/6t

COURSE OUTCOMES:

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

CO'S	COURSE OUTCOMES	COGNITIVE LEVEL
CO1	Make use of the python libraries for data science.	Understand
CO2	Make use of the basic Statistical and Probability measures for data science.	Apply
CO3	Perform descriptive analytics on the benchmark data sets.	Apply
CO4	Perform correlation and regression analytics on standard data sets.	Apply
CO5	Present and interpret data using visualization packages in Python.	Apply

CO – PO Mapping:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	1	-	-	-	1	3	3	3	2	2
CO2	3	2	1	3	1	-	-	-	3	1	3	2	2	1
CO3	3	3	2	3	1	-	-	-	2	1	1	1	1	2
CO4	2	3	2	3	1	-	-	-	2	3	2	3	3	1
CO5	2	2	2	1	1	-	-	-	2	1	3	1	2	2

TEXTBOOK:

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

REFERENCES:

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

NPTEL

1. https://nptel.ac.in/courses/106106179
2. https://nptel.ac.in/courses/106105186
3. https://nptel.ac.in/courses/106106212

BE (CSE)

PUCS3PL02	OBJECT ORIENTED PROGRAMMING LABORATORY	L T P C
		0 0 4 2

COURSE OBJECTIVE

- To understand and implement OOPS concepts..
- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of classes, packages, interfaces, inheritance, exception handling and file processing

1. Write a program to demonstrate the use of multidimensional arrays and looping constructs

2. Write a program to demonstrate the application of String handling functions

3. Develop a java program to create an interface that interface is having two methods called add() and sub(). Create a class for overloading the given methods for the addition and subtraction of two numbers.

4. Write a program to create a package named mypack and import it in circle class...

5. Develop a java code to create a user-defined exception class and handle that exception using

   try, catch block.

6. Write a java program that implements a multi-threaded application that has three threads. The first thread generates a random integer every second and if the value is even, the second thread computes the square of the number and prints. If the value is even, the third thread will print the value of the cube of the number.

7 Develop a java code to read and display file Properties.

8. Develop applications using JavaFX menus.

9. Build a GUI application using JavaFX.

10. Develop a java code to find the maximum value from the given input using a generic function

11. Develop a mini project for any application using Java concepts.

TOTAL: 60 PERIODS

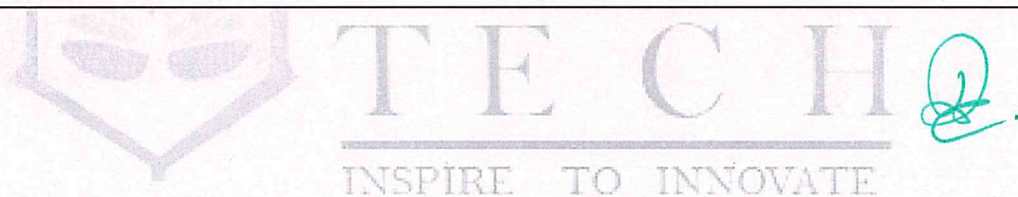**COURSE OUTCOMES**:

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

CO'S	COURSE OUTCOMES	COGNITIVE LEVEL
CO1	Design java programs using object oriented programming concepts	Apply
CO2	Develop simple applications using object oriented concepts such as package, exceptions	Apply
CO3	Implement multithreading, and generics concepts	Apply
CO4	Create GUIs and event driven programming applications for real world problems	Apply
CO5	Implement web applications using Java	Analyze

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CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	1	-	-	–	–	1	1	1	1	1	2
CO2	2	1	2	1	-	-	–	–	1	1	1	1	1	2
CO3	2	2	2	2	-	-	–	–	1	1	1	i	2	2
CO4	2	2	2	2	2	-	–	–	2	1	2	1	2	2
CO5	2	3	3	2	2	-	–	–	2	1	2	1	2	3

REFERENCES:

1. Paul J. Deitel, Harvey Deitel, J a v a SE8 for Programmers (Deitel Developer Series) 3rd Edition, 2014.
2. Paul Deitel Harvey Deitel, Java, How to Program, Prentice Hall; 9th edition , 2011.
3. Cay Horstmann BIG JAVA, 4th edition, John Wiley Sons,2009

PUCC3MC01	MANDATORY COURSES – I	L T P C
	WOMEN AND GENDER STUDIES	3 0 0 3

COURSE OBJECTIVE

1. To provide an effective educational program that will equip students to utilize the frameworks of various disciplines in order to analyze women, gender and sexuality in meaningful ways.

2. To produce interdisciplinary/intersectional student research that addresses political and practical issues of gender in relation to race, ethnicity, class, sexuality, privilege and power.

3. To prepare students to meet the needs of an increasingly ethnically and gender-diverse workplace.

UNIT I: CONCEPTS	9

Sex Vs. Gender, Masculinity, Femininity, Socialization, Matriarchy, Patriarchy, Public/ Private, Essentialism, Binaryism, Power, Hegemony, Hierarchy, Stereotype, Gender Roles, Female, Feminine, Feminist, Gender Relation, Deconstruction, Resistance, Sexual Division Of Labour.

UNIT II: FEMINIST THEORY	9

Feminist thinkers and theories: Liberal, Marxist, Socialist, Radical, Psychoanalytic, Postmodernist, Indian Feminism, Eco-feminism.

UNIT III: WOMEN'S MOVEMENTS: GLOBAL, NATIONAL AND LOCAL	9

Rise of Feminism in Europe and America. Women's Movement in India.

UNIT IV: GENDER AND LANGUAGE	9

Linguistic Forms and Gender. Gender and narratives.

UNIT V: GENDER AND REPRESENTATION	9

Advertising and popular visual media. - Gender and Representation in Alternative Media. - Gender and social media.

COURSE OUTCOMES: (Each unit – one outcome, total 5 outcomes)
At the end of the course, the students will be able:

COs	Course Outcome (CO)	Blooms Taxonomy
CO-1	Define and Evaluate gender as a social construct.	Understand
CO-2	Identify the ways gender, power, privilege, and oppression play out across a range of cultures and human experiences.	Understand
CO-3	Demonstrate an understanding of gender as it intersects with sexuality, race, ethnicity, religion, class and other critical variables.	Understand
CO-4	Analyze human interactions and social/political systems using a "gender lens".	Apply
CO-5	Conduct scholarly research on key gender issues and/or debates in the present modern era.	Apply

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	2	1	3	3	-	3
CO2	-	-	-	-	-	2	2	1	3	3	-	3
CO3	-	-	-	-	-	2	2	1	3	3	-	3
CO4	-	-	-	-	-	2	2	1	3	3	-	3
CO5	-	-	-	-	-	3	2	1	3	3	-	3

CO – PO Mapping

*For Entire Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO

TEXT BOOK:

1. Junaid Dani & Harpreet Haur, <u>Women, Gender and Modern Society,</u> Peridot Literary Books, 2023, ISBN: 9789390393893
2. Melissa J. Gillis and Andrew T. Jacobs, <u>Introduction to Women's and Gender Studies</u>, Oxford University Press, 2019, ISBN: 9780190064235

REFERENCES:

1. Afshar, Haleh. (1991) (Ed), Women, Development and Survival in the Third World, Longman, New York
2. John, Mary (2008) Women's Studies in India: A Reader, Pengiun Books India
3. Sarkar, Tankia and Sumit Sarkar ed., 2007, Women and Social Reform in Modern India (Vol. 1 and Vol. 2), Permanent Black
4. Jain, Jasbir ed., 2014, Women's Writing: Text & Context, Rawat Publication
5. Radha Kumar, The History Of Doing; An illustrated account of women's movement and feminism in india-1800-1900, Zubaan Publications, 2015
6. Flavia Agnes. (1999). Law and Gender Inequality. The Politics of Women's Rights in India. (Oxford University Press: India

WEBSITE REFERENCE:

1. https://en.wikipedia.org/wiki/Gender_studies
2. **https://www.wellesley.edu/departments-programs/department/womens-and-gender-studies**

NPTEL/ SWAYAM/ MOOC REFERENCE:

https://nptel.ac.in/courses/109103122

https://www.youtube.com/watch?v=lI8pyUSg4ns&list=PL2QYOrBMOd7-Jw6OA78pfp4B0oIDhsqwF

PUCC3MC02	MANDATORY COURSES – I	L T P C
	ELEMENTS OF LITERATURE	3 0 0 3

COURSE OBJECTIVE

1. Students will be able to understand the relevance of literature in human life and appreciate its aspects in developing finer sensibilities.
2. Stimulate the interest of the students and sharpen their critical sensibility so that they may appreciate the beauty and richness of the texts they study.

UNIT I: POETRY 9

Poet – Persona/Speaker – Lines – Stanzas – Themes – Types of Poetry
Figurative Language: Simile – Metaphor – Irony – Personification – other Literary devices

UNIT II: PROSE 9

Author – Character – Plot – Setting – Themes – Types of Prose
Narrative Techniques: Flashback – Foreshadowing – Irony – Figurative Devices

UNIT III: DRAMA 9

Playwright – Plot – Dialogue – Characters – Setting –Audience – Themes; Types of Drama: Comedy – Tragedy – Modern Drama – Indian Drama; Dramatic Techniques: Dramatic Irony – Situational Irony

UNIT IV: FICTION & NOVEL 9

Bildungsroman, Picaresque, Epistolary, Stream-of-Consciousness, Novel of Social Reality, Psychological Novel , Historical Novel, Science Fiction, Gothic Novel and Graphic Novel

UNIT V: LITERARY CRITICISM 9

Definition - Classical and medieval criticism - Renaissance criticism - Baroque criticism - Enlightenment criticism - 19th-century Romantic criticism - The New Criticisms – Eco Criticism

TOTAL: 45 PERIODS

COURSE OUTCOMES: (Each unit – one outcome, total 5 outcomes)
At the end of the course, the students will be able:

COs	Course Outcome (CO)	Blooms Taxonomy
CO-1	Analyze the various elements of poetry and develop their critical thinking skills.	Apply
CO-2	Comprehend Complex academic texts for narrating experience and events.	Understand
CO-3	To understand the nature of the dramatic genres including comedy, romance, tragedy, and history.	Understand
CO-4	To analyze the texts and understand the modernist techniques in the narratives & to develop critical thinking and close reading of texts.	Apply
CO-5	Critically view literary artifacts & apply high seriousness as guiding principles in appreciating literature.	Apply

CO – PO Mapping

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	2	1	3	3	-	3
CO2	-	-	-	-	-	2	2	1	3	3	-	3
CO3	-	-	-	-	-	2	2	1	3	3	-	3
CO4	-	-	-	-	-	2	2	1	3	3	-	3
CO5	-	-	-	-	-	3	2	1	3	3	-	3

*For Entire Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO

INSPIRE TO INNOVATE

TEXT BOOK:

1. Nozar Niazi & Rama Gautam, <u>How To Study Literature : Stylistic And Pragmatic Approaches</u>, Prentice Hall of India; 1st edition, 2010, ISBN – 10: 8120340612

2. Mahdi Javidshad, Amirhossein Nemati, <u>An Outline Of The Norton Anthology Of English Literature</u>, Arb Publications, 2024, ISBN-10: 9382527559

REFERENCES:

1. David Green, <u>The Winged World</u>, Macmillan Education, 2016, ISBN-10: 9352521005

2. Patricia Waugh, <u>Literary Theory and Criticism</u>, Oxford University Press, 2006.

3. George. K. M., <u>Modern Indian Literature – An Anthology</u>, Sahitya Akademi, 1994, ISBN: 8172017839

4. X. J. Kennedy, Dana Gioia, <u>Literature: An Introduction to Fiction, Poetry, Drama, and Writing</u>, Pearson; 13th edition, 2015, ISBN – 10: 0321971663

5. About Edgar V. Roberts, <u>Literature: An Introduction to Reading and Writing</u>, Pearson; 6th edition, 2014, ISBN – 10: 032194478X

WEBSITE REFERENCE:

1. https://www.britannica.com/art/literature
2. https://www.worldhistory.org/literature/
3. https://www.ereadingworksheets.com/e-reading-worksheets/all-reading-worksheets-list/
4. https://www.readingandwritinghaven.com/10-of-the-best-literary-analysis-activities-to-elevate-thinking

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. https://onlinecourses.nptel.ac.in/noc22_hs01/preview
2. https://archive.nptel.ac.in/courses/109/106/109106124/

PUCC3MC03	MANDATORY COURSES – I	L T P C
	FILM APPRECIATION	3 0 0 3

COURSE OBJECTIVE

1. To understand the relevance of Films and Movies in human life and appreciate its aspects in developing analytical sense.
2. To stimulate the interest of the students and sharpen their critical sensibility so that they can appreciate the aesthetics of films practically.

UNIT I: The Component Of Films	9

The material and equipment - The story, screenplay and script -The actors, crew members, and the director - The process of film making & structure of a film

UNIT II: Evolution of Film Language	9

Film language, form, movement etc. - Early cinema... silent film (Particularly French) - The emergence of feature films: Birth of a Nation - Talkies

UNIT III: Film Theories and Criticism/Appreciation	9

Realist theory; Auteurists - Psychoanalytic, Ideological, Feminists - How to read films? - Film Criticism / Appreciation

UNIT IV: Development of Films	9

Representative Soviet films - Representative Japanese films - Representative Italian films - Representative Hollywood film and the studio system

UNIT V: Indian Films	9

The early era - The important films made by the directors - The regional films - The documentaries in India

TOTAL: 45 PERIODS

RF(CSE)

COURSE OUTCOMES: (Each unit – one outcome, total 5 outcomes)
At the end of the course, the students will be able:

COs	Course Outcome (CO)	Blooms Taxonomy
CO-1	Analyze the various Components of Films and develop their critical thinking skills.	Apply
CO-2	To understand the evolutionary levels of Films and analyze its linguistic nature.	Understand
CO-3	To understand the nature of the Film genres including comedy, romance, tragedy, and history and appreciate it as criticism.	Understand
CO-4	To analyze the history of films at universal level.	Apply
CO-5	To Understand the native film techniques and appreciate it.	Understand

CO – PO Mapping

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	2	1	3	3	-	3
CO2	-	-	-	-	-	2	2	1	3	3	-	3
CO3	-	-	-	-	-	2	2	1	3	3	-	3
CO4	-	-	-	-	-	2	2	1	3	3	-	3
CO5	-	-	-	-	-	3	2	1	3	3	-	3

*For Entire Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO

BE (CSE) 81

TEXT BOOK:

1. Jill Nelmes, <u>An Introduction to Film Studies</u>, Routledge, 2012, ISBNL: 9780415582599
2. Barnouw, E. and Krishnaswamy, S., <u>Indian Film</u> (2nd edn), Oxford University Press, New York, 1980

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1. Chatterji, Gayatri , Mother India , BFI Classics, BFI, London, 2002.
2. Chopra, Anupama , Sholay: The Making of a Classic, Penguin Books India, New Delhi, 2000.
3. Desai, Jigna , Beyond Bollywood: The Cultural Politics of South Asian Diasporic Film, Routledge, New York and London, 2004.
4. Ganti, Tejaswini , Bollywood: A Guidebook to Popular Hindi Cinema, Routledge, New York and London, 2004.
5. Pendakur, Manjunath , Indian Popular Cinema: Industry, Ideology, and Consciousness , Hampton Press, Cresshill, NJ, 2003.
6. Rai, Amit S. , Untimely Hollywood: Globalization and India's New Media Assemblage , Duke University Press, Durham, NC and London, 2009.
7. Rajadhyaksha, Ashish and Willeman, Paul (eds), Encylopaedia of Indian Cinema (2nd edn), British Film Institute, London, 1999.

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1. https://testbook.com/objective-questions/mcq-on-cinema--626bb8c22de86486d8920d08
2. https://www.videomaker.com/how-to/directing/film-history/an-introduction-to-film-studies/
3. https://www.youtube.com/watch?v=g3qFVVjzQFA
4. https://www.filmconnection.com/reference-library/how-the-internet-has-changed-movies-and-the-movie-business/

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. https://onlinecourses.nptel.ac.in/noc21_hs17/preview
2. https://onlinecourses.swayam2.ac.in/cec23_ge0
3. https://www.ftii.ac.in/p/courses8/preview

PUCC3MC04	MANDATORY COURSES – I	L T P C
	THE CONSTITUTION OF INDIA	3 0 0 3

COURSE OBJECTIVE

1. To create an awareness in students on the Constitution of India.
2. To understand the function wings of the Government, fundamental rights and duties of citizens.
3. To analyse the powers of central, state, and local government, and strengthen constitutional institutions.

UNIT I: INTRODUCTION TO INDIAN CONSTITUTION   9

Constitution meaning of the term - The making of the Indian Constitution – Sources and constitutional history – Salient features of Indian Constitution - Philosophy of Constituent Assembly - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT II: THE UNION: EXECUTIVE, LEGISLATIVE AND JUDICIARY   9

Union Government and its Administration Structure: Role, power and position of President and Vice President; PM and Council of ministers, Cabinet and Central Secretariat: Powers and Functions of Lok Sabha, Rajya Sabha, The Supreme Court and High Court

UNIT III: THE STATES AND THE UNION TERRITORIES   9

State Government and its Administration: Governor -Role and Position – CM and Council of ministers, State Secretariat: Organisation, Structure and Functions – Relation between the Union and the States.

UNIT IV: LOCAL ADMINISTRATION   9

District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative – Panchayati Raj: Functions PRI: Zilla Panchayat, 73rd and 74th amendments; Elected officials and their roles - Block level Organizational Hierarchy, Village level - Role of Elected and Appointed officials - Importance of grass-root democracy

UNIT V: EMERGENCY PROVISIONS AND THE MAJOR FUNCTIONARIES   9

Emergency: Proclamation of Emergency, types of emergency – Election Commission – Union Service Public Commission – Planning Commission (NITI).

TOTAL: 45 PERIODS

COURSE OUTCOMES: (Each unit – one outcome, total 5 outcomes)
At the end of the course, the students will be able:

COs	Course Outcome (CO)	Blooms Taxonomy	CO – PO Mapping
CO-1	Describe historical background of the constitution making and its importance for building ademocratic India.	Apply	
CO-2	Explain the functioning of three wings of the Union government i.e., executive, legislative andjudiciary.	Understand	
CO-3	Explain the functions of State Government and the Union Territories and compare with the Union.	Understand	
CO-4	Analyse the decentralization of power between central, state and local self-government.	Apply	
CO-5	Apply the knowledge in strengthening of the constitutional institutions like CAG, NITI Election Commission and USPC for sustaining democracy.	Apply	*For Entire

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	2	1	3	3	-	3
CO2	-	-	-	-	-	2	2	1	3	3	-	3
CO3	-	-	-	-	-	2	2	1	3	3	-	3
CO4	-	-	-	-	-	2	2	1	3	3	-	3
CO5	-	-	-	-	-	3	2	1	3	3	-	3

Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO

TEXT BOOK:

1. **Sujit Choudhry, Madhav Khosla**, The Oxford Handbook of the Indian Constitution, Oxford University Press Indian Ltd. **2016, ISBN: 9780198787334**
2. **Mahendra P Singh**, Constitution of India, **Eastern Book Company**, 2024, **ISBN: 9789351453512**

REFERENCES:

1. Fali S. Nariman, You Must Know Your Constitution, Hay House Publishers India, 2023, ISBN-10 : 8195991726
2. P M Bakshi, Constitution of India, Lexis Nexis, 19th edition 2023

WEBSITE REFERENCE:

1. https://cdnbbsr.s3waas.gov.in/s380537a945c7aaa788ccfcdf1b99b5d8f/uploads/2023/05/2023050195.pdf
2. https://books.google.co.in/books?hl=en&lr=&id=d0knDAAAQBAJ&oi=fnd&pg=PP1&dq=online+material+on+the+constitution+of+india&ots=NCBHUYUqJn&sig=gKBTjU0Wua3EBaYI3GUn9CarZXQ#v=onepage&q=online%20material%20on%20the%20constitution%20of%20india&f=false
3. https://en.bharatpedia.org/wiki/Constitution_of_India

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. https://onlinecourses.nptel.ac.in/noc24_lw05/preview
2. https://archive.nptel.ac.in/courses/129/106/129106003/
3. https://legalaffairs.nalsar.ac.in/students/student/course-details/1/courses

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SEMESTER IV

S.NO.	COURSE CODE	COURSE NAME	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT	CREDITS
				L	T	P		
THEORY								
1.	PUCC4BS07	Environmental Science & Sustainability	BS	3	-	-	3	3
2.	PUIT4PC02	Operating Systems	PC	3	1	-	4	4
3.	PUAD4PC01	Artificial Intelligence and Machine Learning	PC	3	-	-	3	3
4.	PUIT4PC03	Database Management Systems	PC	3	-	-	3	3
5.	PUCS4PC05	Software Engineering	PC	3	-	-	3	3
6.	PUCC4MCXX	Mandatory Course – II	MC	2	-	-	2	0
PRACTICAL								
7.	PUIT4PL01	Operating Systems Laboratory	PC	-	-	4	4	2
8.	PUIT4PL02	Database Management Systems Laboratory	PC	-	-	4	4	2
9.	PUAD4PL01	Artificial Intelligence and Machine Learning Lab	PC	-	-	4	4	2
10	PUCC4HM08	Extension Activities	HM	-	-	1	1	0
		Total		17	-	13	30	22

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PUCC4BS07	ENVIRONMENTAL SCIENCE AND SUSTAINABILITY	L T P C
		3 0 0 3

COURSE OBJECTIVE

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenarios of renewable and non-renewable resources, causes of their degradation and measures to preserve them.
- To familiarize the concept of global sustainable development goals and actions taken to achieve sustainability.
- To understand the environmental impact of the human population and the role of information technology in environment.

UNIT I – ENVIRONMENT, ECOSYSTEM AND BIODIVERSITY	9

Definition, Scope and Importance of Environment – Need for Public Awareness - Concept of an Ecosystem – Structure and Function of an Ecosystem – Energy Flow in the Ecosystem – Ecological Succession – Food Chains, Food Webs and Ecological Pyramids – Introduction, Types, Characteristic Features, Structure and Function of the various types of ecosystems – Introduction to Biodiversity Definition: Genetic, Species and Ecosystem Diversity – Value of Biodiversity – India as a Mega-Diversity Nation – Hot-Spots of Biodiversity – Threats to Biodiversity – Endangered and Endemic Species of India – Conservation of Biodiversity.

UNIT II – ENVIRONMENTAL POLLUTION AND DISASTER MANAGEMENT	9

Definition - Causes, Effects and Control Measures of Air, Water, Soil, Noise and Light Pollutions - Pollution Case Studies - Solid waste, Hazardous waste and E-waste Management – Disaster Management: Floods, Earthquake, Cyclone and Landslides, Climate change, Global Warming. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts.

UNIT III - NON-RENEWABLE AND RENEWABLE SOURCES OF ENERGY	9

Non-renewable energy sources (coal, petroleum, LPG, natural gas, nuclear) - Environmental Impact – air pollution control methods - Energy management and conservation, Concept, process, applications of Renewable energy sources (solar, wind, geothermal, ocean, hydrogen, tidal, biomass) New Energy Sources: Need of new sources. Different types new energy sources.

UNIT IV – SUSTAINABILITY PRACTICES AND MANAGEMENT	9

Development, GDP, Sustainability - concept, needs and challenges – economical social and governance for sustainability (ESG) - from unsustainability to sustainability - 17 Global Sustainable Development Goals - Action plan to achieve - Zero waste and R concept.

UNIT V – HUMAN POPULATION AND ENVIRONMENT	9

Population Growth, Variation Among Nations – Population Explosion – Family Welfare Programme – Human Rights – Value Education – Women and Child Welfare – Role of Information Technology in Environment and Human Health. Environmental Impact Assessment. Green Engineering: Green buildings, Green materials.

TOTAL: 45 PERIODS

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COURSE OUTCOMES:

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

CO'S	COURSE OUTCOMES	COGNITIVE LEVEL
CO1	To recognize and understand the functions of the environment, ecosystems and biodiversity and their conservation.	Understand
CO2	To identify the causes and effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.	Application
CO3	To recognize the need for renewable and the effect of non-renewable resources and contribute to sustainable measures to preserve them for future generations.	Understand
CO4	To apply global sustainable development goals, practices and action plans to achieve societal development.	Application
CO5	To learn about the human welfare program, green materials and the role of information technology in the environment.	Application

CO – PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	-	2	3	1	1	1	-	2
CO2	3	2	-	-	-	3	3	1	1	1	-	3
CO3	3	1	-	-	-	2	2	1	1	1	-	2
CO4	3	2	-	-	-	2	2	1	1	1	-	2
CO5	3	2	-	-	-	2	2	1	1	1	-	2

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

TEXTBOOK:

- Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2017.
- Ajay Ahlawat, Sustainable Development Goals: Directive Principles for Sustainable India by 2030, First Edition, Notion Press, 2019.
- Gilbert M. Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

REFERENCES:

- Manoj Kumar Arya, Biodiversity Environment and Ecosystem Services, Discovery Publishing House Pvt Ltd, 2023.
- C.S. Rao, Environmental Pollution Control Engineering, New Age International Private Limited, Fourth edition, 2021.
- D.S. Chauhan, S.K. Srivastava, Non-Conventional Energy Resources, New Age International Private Limited, Fourth edition, 2021.
- R.K. Trivedi, — Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, B.S. Publications, 2010.
- Rajagopalan, R 'Environmental Studies-From Crisis to Cure', Oxford University Press, Fourth edition, 2023.
- Twidell, J.W. & Weir A., "Renewable Energy Resources", EFNSpon Ltd., UK, 2015.

NPTEL/ SWAYAM/ MOOC REFERENCE:

- Complex Ecosystem Dynamics - Course (swayam2.ac.in) - Complex Ecosystem Dynamics

PUIT4PC02	OPERATING SYSTEMS	L T P C
		3 1 0 3

COURSE OBJECTIVE

- To understand the basics and functions of operating systems.
- To analyze scheduling algorithms and process synchronization
- To understand the concept of deadlocks and mutual exclusion
- analyze various memory management schemes and swapping mechanism
- To be familiar with the basics of Virtual machines, Linux OS and Mobile OS

UNIT I	INTRODUCTION	9

Computer System introduction - Basic Elements and Organization. Operating system overview - objectives and functions, Evolution of Operating System - Computer System Organization, Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.

UNIT -II	PROCESS MANAGEMENT	11+4

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

UNIT - III	MEMORY MANAGEMENT	9+3

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

UNIT-IV	STORAGE MANAGEMENT	9+3

Disk Structure - Disk Scheduling and Management; swapping mechanism, File-System Interface - File concept - Access methods - Directory Structure - Directory organization - File system mounting - File Sharing and Protection; File System Implementation - File System Structure - Directory implementation - Allocation Methods - Free Space Management; I/O Systems.

UNIT- V	VIRTUAL MACHINES, LINUX AND MOBILE OS	9+3

Virtual Machines –Evolution of VM-Benefits and Features, Building Blocks, Types of Virtual Machines and their Implementations, Virtualization, Linux system: Architecture of Linux in OS, Mobile OS - iOS and Android.

TOTAL: 60 PERIODS

BE(CSE)

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

COs	Course outcomes	Cognitive Level
CO 1	Classify on various memory management schemes.	Understand
CO2	Examine the various concept in CPU scheduling, page replacement and avoidance of deadlock.	Analyze
CO 3	Demonstrate with example of segmentation with paging and virtual memory.	Apply
CO 4	Discuss about the functionality of file systems.	Understand
CO 5	Implement and perform administrative tasks on Linux Servers	Apply

CO – PO Mapping

S. No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	2	2	-	2	2	1
CO2	3	2	2	2	2	-	1	-	2	1	-	2	2	2
CO3	3	3	3	3	1	-	1	-	2	2	-	1	1	2
CO4	3	3	3	3	2	-	1	-	2	2	-	1	2	1
CO5	3	2	3	2	1	-	-	-	2	2	-	1	2	2

TEXT BOOK:

1. Abraham Silberschatz, Peter Galvin and Gagne, "Operating System Concepts", Addison Wesley, 10th Edition, 2018.
2. Andrew S. Tanenbaum, "Modern Operating Systems".4th edition, 2015.

REFERENCES:

1. Harvey M. Deitel," Operating System", Addison Wesley, 3rd Edition, 2004.
2. Gary Nutt," Operating System, A modern perspective", Addison Wesley, 3rd Edition, 2004.
3. Richard Peterson, "Linux: The Complete Reference", Tata McGraw Hills, 6th Edition, 2008.
4. Daniel P Bovet and Marco Cesati, "Understanding the Linux kernel", 3rd edition, O'Reilly, 2005.
5. Neil Smyth, "iPhone iOS 4 Development Essentials – Xcode", Fourth Edition, Payload media, 2011.

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. https://archive.nptel.ac.in/courses/106/105/106105214/

BE (CSE) 89

PUAD4PC01	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	L T P C
		3 0 0 3

COURSE OBJECTIVE

- Acquaint with fundamentals of artificial intelligence.
- Learn problem solving and probabilistic reasoning.
- Understand basic algorithms used in classification and regression problems.
- Outline steps involved in development of Unsupervised learning model.
- Familiarize with concepts of Neural Networks.

UNIT I: INTRODUCTION TO AI   9

AI - History of AI - Agents - Structure of Intelligent agents - Environments -Problem solving agents - Formulating problems – Uninformed search -Breadth-first - Uniform cost - Depth-first - Depth-limited - Bidirectional - Informed Search - Best-first Heuristic Functions - Memory bounded search - A* - Hill Climbing .

UNIT II: PROBLEM SOLVING AND PROBABILISTIC REASONING   9

Game playing – Min –Max - Alpha-beta pruning - Acting under uncertainty – Bayesian inference – naïve bayes models, Probabilistic reasoning – Bayesian networks.

UNIT III: SUPERVISED LEARNING   9

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

UNIT IV: ENSEMBLE LEARNING AND UNSUPERVISED LEARNING   9

Combining multiple learners: Model combination schemes, Voting, Ensemble Learning - bagging, boosting, stacking, Unsupervised learning: K-means, Instance Based Learning: KNN, Agglomerative and Divisive

UNIT - V: NEURAL NETWORKS   9

Perceptron - Multilayer perceptron, activation functions, network training – gradient descent optimization – stochastic gradient descent, error backpropagation, from shallow networks to deep networks –Unit saturation– ReLU, hyperparameter tuning, batch normalization, regularization, dropout.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO'S	COURSE OUTCOMES	COGNITIVE LEVEL
CO1	Demonstrate fundamentals of artificial intelligence.	Understand
CO2	Infer problem solving and probabilistic reasoning.	Understand
CO3	Apply machine learning algorithms for classification and regression	Apply
CO4	Devise and develop unsupervised learning model	Apply
CO5	Construct neural networks and perform optimizations.	Apply

CO – PO Mapping:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	-	-	-	2	2	-	1	2	2
CO2	3	3	3	2	3	-	-	-	2	2	-	1	3	2
CO3	3	3	3	2	3	-	-	-	2	2	-	1	3	2
CO4	3	3	3	2	3	-	-	-	2	2	-	1	3	2
CO5	3	3	3	2	3	-	-	-	2	2	-	1	3	2

TEXTBOOK:

1. Tom Mitchell, "Machine Learning", McGraw Hill, 3rd Edition,1997.

2.Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", Fourth Edition, Pearson Education, 2021.

3.Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Fourth Edition, 2020.

REFERENCES:

1.Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Pearson Education,2007

2. Kevin Night, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2008

3. Patrick H. Winston, "Artificial Intelligence", Third Edition, Pearson Education, 2006

4. Deepak Khemani, "Artificial Intelligence", Tata McGraw Hill Education, 2013

5. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2006.

NPTEL

1. https://nptel.ac.in/An Introduction to Artificial Intelligence

BE(CSE)91

PUIT4PC03	DATABASE MANAGEMENT SYSTEMS	L T P C
		3 0 0 3

COURSE OBJECTIVE

- To understand the concept of DBMS and ER Modeling.

- To learn the normalization techniques.

- To apply the concurrency control, recovery for the real time data

- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design

- To understand the concept of NOSQL Queries in various concept of data models

UNIT -I	INTRODUCTION TO DATABASES	9

Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys –Relational Algebra-SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL- Entity Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to Relational Mapping.

UNIT -II	NORMALIZATION	9

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

UNIT - III	TRANSACTIONS	9

Transaction Concepts – ACID Properties – Schedules – Serializability – Transaction support in SQL – Need for Concurrency – Concurrency control –Two Phase Locking- Timestamp – Multiversion – Validation and Snapshot isolation– Multiple Granularity locking – Deadlock Handling – Recovery Concepts – Recovery based on deferred and immediate update – Shadow paging – ARIES Algorithm.

UNIT-IV	IMPLEMENTATION TECHNIQUES	9

RAID – File Organization – Organization of Records in Files – Data dictionary Storage – Column Oriented Storage– Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for Selection, Sorting and join operations – Query optimization using Heuristics - Cost Estimation.

UNIT- V	RECENT TRENDS - NOSQL DATABASE MANAGEMENT	9

Introduction, Need of NoSQL, CAP Theorem, different NoSQL data models: Key-value stores, Column families, Document databases, Graph databases

	TOTAL: 45 PERIODS

BE(CSE)a1

COURSE OUTCOMES:

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

COs	Course outcomes	Blooms Level
CO 1	Construct SQL Queries using relational algebra and Design database using ER model.	Create
CO2	Illustrate the design principles for normalization.	Understand
CO 3	Apply Concurrency control and recovery mechanisms for the desirable database problem.	Apply
CO 4	Demonstrate the basics of query evaluation and heuristic query optimization techniques	Understand
CO 5	Review the fundamental view on unstructured data and its management.	Evaluate

CO – PO Mapping

S. No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	1	-	-	-	2	2	1	3	2	1
CO2	3	1	1	1	1	-	-	-	2	3	1	2	1	1
CO3	3	2	3	2	1	-	-	-	2	2	3	3	2	2
CO4	1	2	3	2	-	-	-	-	3	1	2	3	2	2
CO5	1	1	3	3	2	-	-	-	1	2	2	2	2	2

TEXT BOOK:

3. R. Elmasri S. B. Navathe, Fundamentals of Database Systems, Addison Wesley, 2015.

4. Raghu Ramakrishnan, Database Management Systems, Mcgraw-Hill, 4th edition, 2015.

REFERENCES:

1. Abraham Silberschatz, H. F. Korth S. Sudershan, Database System Concepts, McGraw Hill, 6th Edition 2010.
2. Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to Design, Implementation and Management, 6th Edition, 2012.
3. Pramod J. Sadalage and Marin Fowler, NoSQL Distilled: A brief guide to merging world of Polyglot persistence, Addison Wesley, 2012

NPTEL/ SWAYAM/ MOOC REFERENCE:

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

BE (CSE) a

PUCS4PC05	SOFTWARE ENGINEERING	L T P C
		3 0 0 3

COURSE OBJECTIVE

- To understand the phases in a software project
- To understand fundamental concepts of requirements engineering and Analysis Modeling.
- To understand the various software design methodologies
- To learn various testing and maintenance measures

UNIT I: - SOFTWARE PROCESS AND AGILE DEVELOPMENT	9

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models – Introduction to Agility-Agile process-Scrum.

UNITII:-REQUIREMENTS ANALYSIS AND SPECIFICATION	9

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document — Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management- Data Dictionary.

UNIT III: - SOFTWARE DESIGN	9

Design process — Design Concepts-Design Model– Design Heuristic — Architectural Design - Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design

UNIT IV: - TESTING AND VALIDATION	9

Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing — Unit Testing — Integration Testing — Validation Testing — System Testing And Debugging

UNIT V: - RISK AND QUALITY MANAGEMENT	9

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM. Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

	TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO'S	COURSE OUTCOMES	COGNITIVE LEVEL
CO1	Identify the key activities in managing a software project.	Understand
CO2	Identify the functional and Non Functional requirements.	Understand
CO3	Apply systematic procedure for software design	Apply
CO4	Infer the various testing concepts.	Apply
CO5	Manage project schedule, estimate project cost and effort required.	Understand

CO – PO Mapping

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	1	2	2	2	2	2	2
CO2	3	3	3	2	-	-	-	1	2	2	2	2	3	2
CO3	3	3	3	2	-	-	-	1	2	2	2	2	3	2
CO4	3	3	3	2	-	-	-	1	2	2	2	2	3	2
CO5	3	3	3	2	-	-	-	1	2	2	2	2	3	2

TEXT BOOK:

1. Roger S. Pressman, —Software Engineering – A Practitioner"s Approach‖, 9th Edition, McGraw-Hill International Edition, 2019.
2. Ian Sommerville, —Software Engineering‖, 9th Edition, Pearson Education Asia, 2011.

REFERENCES:

1. Rajib Mall, —Fundamentals of Software Engineering‖, Third Edition, PHI Learning PrivateLimited, 2009.

2. Pankaj Jalote, —Software Engineering, A Precise Approach‖, Wiley India, 2010.
3. Kelkar S.A., —Software Engineering‖, Prentice Hall of India Pvt Ltd, 2007.
4. Stephen R.Schach, —Software Engineering‖, Tata McGraw-Hill Publishing Company Limited,2007.

NPTEL/ SWAYAM/ MOOC REFERENCE:

1. https://nptel.ac.in/ Software Engineering,Prof. Rajib Mall,IIT Kharagpur, NPTEL Course.

BE(CSE)95

PUIT4PL01	OPERATING SYSTEM LABORATORY	L T P C
		0 0 4 2

COURSE OBJECTIVE

- To install windows operating systems.
- To understand the basics of Linux command and shell programming.
- To implement various CPU scheduling algorithms, Deadlock Avoidance and Deadlock Detection Algorithms
- To implement Page Replacement Algorithms and various memory allocation methods
- To be familiar with File Organization and File Allocation Strategies.

1. Installation of windows operating system.

2. Execute the Linux commands and Shell Programming.

3. Implement Process Management using System Calls: Fork, Exit, Getpid, Wait, Close.

4. Write a program to implement the various CPU Scheduling Algorithms.

5. Implement mutual exclusion by using Semaphore.

6. Write a program to avoid Deadlock using Banker's Algorithm.

7. Write a program to implement the paging Technique.

8. Write a program to implement the various Page Replacement Algorithms.

9. Implement the following File Allocation Strategies using C programs.

     a. Sequential   b.Indexed   c.Linked

10. Write a program for the implementation of various disk scheduling algorithms.
11. Install any guest operating system like Linux using VMware.

TOTAL: 60 PERIODS

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

COs	Course outcomes	Cognitive Level
CO 1	Classify on various memory management schemes.	Understand
CO2	Examine the various concept in CPU scheduling, page replacement and avoidance of deadlock.	Analyze
CO 3	Demonstrate with example of segmentation with paging and virtual memory.	Apply
CO 4	Discuss about the functionality of file systems.	Understand
CO 5	Implement and perform administrative tasks on Linux Servers	Apply

CO – PO Mapping

S. No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	1	-	-	-	2	2	-	2	2	1
CO2	3	2	2	2	2	-	1	-	2	1	-	2	2	2
CO3	3	3	3	3	1	-	1	-	2	2	-	1	1	2
CO4	3	3	3	3	2	-	1	-	2	2	-	1	2	1
CO5	3	2	3	2	1	-	-	-	2	2	-	1	2	2

REFERENCES:

1.Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 10th Edition, John Wiley and Sons Inc., 2018.

2. Andrew S Tanenbaum, "Modern Operating Systems", Pearson, 5th Edition, 2022 New Delhi.

3. William Stallings, "Operating Systems: Internals and Design Principles", 7 th Edition, Prentice Hall, 2018.

BF (CSE) 96

PUIT4PL02	DATABASE MANAGEMENT SYSTEMS LABORATORY	L T P C
		0 0 4 2

COURSE OBJECTIVE

1. Have basics of data manipulation skills through SQL
2. Understand how to write complex queries, sub queries and joins
3. Understand the significance of using views, synonyms, sequences, indexes and constraints
4. Have basics of data processing skills through PL/SQL, triggers, procedures, exceptions and functions
5. Have basics of developing mini project using database systems

LIST OF EXPERIMENTS:

1. Creation of a database and writing SQL queries to retrieve information from the database.
2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
3. Create complex queries and sub queries.
4. Perform different types of joins.
5. Creation of Views, Synonyms, Sequence, Indexes, save point.
6. Creating an Employee database to set various constraints.
7. Creating relationship between the databases.
8. Study of PL/SQL block.
9. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
10. Write a PL/SQL block that handles all types of exceptions.
11. Creation of Procedures.
12. Creation of database triggers and functions.

TOTAL: 60 PERIODS

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

COs	Course Outcomes	Cognitive Level
CO1	Design database of required form and retrieve information from it using SQL	Create
CO2	Use complex queries, sub queries and joins	Apply
CO3	Develop databases using views, synonyms, sequences, indexes and constraints	Apply
CO4	Create PL/SQL functions, triggers, procedures, exceptions and functions	Create
CO5	Implement a mini project with database design for given problem	Apply

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	1	-	-	-	2	2	1	3	2	1
CO2	3	1	1	1	1	-	-	-	2	3	1	2	1	1
CO3	3	2	3	2	2	-	-	-	2	2	3	3	2	2
CO4	1	2	3	2	1	-	-	-	3	1	2	3	2	2
CO5	1	1	3	3	2	-	-	-	1	2	2	2	2	2

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1. Abraham Silberschatz, H. F. Korth S. Sudershan, Database System Concepts, McGraw Hill, 6th Edition 2010.
2. Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to Design, Implementation and Management,6th Edition,2012.
3. Pramod J. Sadalage and Marin Fowler, NoSQL Distilled: A brief guide to merging world of Polyglot persistence, Addison Wesley, 2012

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CO – PO Mapping:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	-	-	1	2	2	-	1	2	2
CO2	3	3	3	2	3	-	-	1	2	2	-	1	3	2
CO3	3	3	3	2	3	-	-	1	2	2	-	1	3	2
CO4	3	3	3	2	3	-	-	1	2	2	-	1	3	2
CO5	3	3	3	2	3	-	-	1	2	2	-	1	3	2

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1. Tom Mitchell, "Machine Learning", McGraw Hill, 3rd Edition,1997.

2.Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", Fourth Edition, Pearson Education, 2021.

3.Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Fourth Edition, 2020.

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1.Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Pearson Education,2007

2. Kevin Night, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2008

3. Patrick H. Winston, "Artificial Intelligence", Third Edition, Pearson Education, 2006

4. Deepak Khemani, "Artificial Intelligence", Tata McGraw Hill Education, 2013 (http://nptel.ac.in/)

5. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2006.

6. Charu C. Aggarwal, "Data Classification Algorithms and Applications", CRC Press, 2014

7. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, "Foundations of Machine Learning", MIT Press, 2012.

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PUCC4MC02	MANDATORY COURSES – II	L T P C
	INDIAN HISTORY OF SCIENCE AND TECHNOLOGY	3 0 0 3

COURSE OBJECTIVE

To provide an understanding of the socio-cultural and philosophical context in which the various scientific and technological ideas got developed in India
Stimulate students interest in knowing various evolutions and thereby help in repositioning India's contributions in science and technology.

UNIT I: CONCEPTS AND PERSPECTIVES   9

Science and Technology-Meaning, Scope and Importance, Interaction of science, technology & society, Sources of history on science and technology in India.
Introduction to the works of D.D. Kosambi, Dharmpal, Debiprasad Chattopadhyay, Rehman, S. IrfanHabib, Deepak Kumar, Dhruv Raina, and others

UNIT II: SCIENCE AND TECHNOLOGY IN ANCIENT INDIA   9

Technology in pre-historic period - Beginning of agriculture and its impact on technology - Science and Technology during Vedic and Later Vedic times-Science and technology from 1st century AD to C-1200.

UNIT III: SCIENCE AND TECHNOLOGY IN MEDIEVAL INDIA   9

Legacy of technology in Medieval India, Interactions with Arabs-Development in medical knowledge, interaction between Unani and Ayurveda and alchemy-Astronomy and Mathematics: interaction with Arabic Sciences-Science and Technology on the eve of British conquest

UNIT IV: SCIENCE AND TECHNOLOGY IN COLONIAL INDIA   9

Science and the Empire - Indian response to Western Science Growth of techno-scientific institutions

UNIT V: SCIENCE AND TECHNOLOGY IN A POST-INDEPENDENT INDIA   9

Science, Technology and Development discourse - Shaping of the Science and Technology - Policy Developments in the field of Science and Technology -   Science and technology in globalizing India-Social implications of new technologies like the Information Technology and Biotechnology.

TOTAL: 45 PERIODS

COURSE OUTCOMES: (Each unit – one outcome, total 5 outcomes)
At the end of the course, the students will be able:

COs	Course Outcome (CO)	Blooms Taxonomy
CO-1	Able to explain the origin and development of Science & Technology in India.	Understand
CO-2	Able to Summarize the evolution of Science and Technology in Ancient India.	Understand
CO-3	Comprehend the evolution of Science and Technology in Medieval India.	Understand
CO-4	Comprehend the evolution of Science and Technology during Colonialism.	Understand
CO-5	Comprehend the evolution of Science and Technology during Modern period in India.	Understand

CO – PO Mapping

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	3	-	-	1	1	-	3
CO2	-	-	-	-	-	3	-	-	1	1	-	3
CO3	-	-	-	-	-	3	-	-	1	1	-	3
CO4	-	-	-	-	-	3	-	-	1	1	-	3
CO5	-	-	-	-	-	3	-	-	1	1	-	3

*For Entire Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO

TEXT BOOK:

1. Kuppuram. G.: History of Science and Technology in India, South Asia Books, 1990, ISBN-13: 978-8185067315.
2. Dr. P Lathwal,: A Brief History of Science & Technology In India, Indu Book Services Pvt Ltd, 2022, ISBN: 9789391377205

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1. Suvobrata Sarkar, : History of Science, Technology, Environment, and Medicine in India, Taylor & Francis, 2021, ISBN: 1000485005
2. Rattan Lal Hangloo,: HISTORY OF SCIENCE AND TECHNOLOGY: Exploring New Themes, Rawat Publications, 2011, ISBN 9788131604267
3. Dilip K. Chakrabarti,: History of Ancient India: Volume IX: Science and Technology, Medicine, Aryan Books International, 2023, ISBN: 9788173054884
4. ___:The Great Indian Scientists,: Cengage India Private Limited, 2017, ISBN-13 : 978-8131533321
5. D M Bose, S N Sen, B V Subbarayappa,: A Concise History of Science in India, Orient Blackswan, 2009, ISBN: 9788173716195

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BE(CSE)1

PUCC4MC03	MANDATORY COURSES – II	L T P C
	POLITICAL AND ECONOMIC THOUGHT FOR A HUMANE SOCIETY	3 0 0 3

COURSE OBJECTIVE

1. To Understand the political history of a diversity of development paradigms.
2. To Develop a comparative research paper that seeks to understand why development politics and outcomes have varied across time and/or across geographic space.
3. To read theoretical and policy literature and be able to identify key concepts, arguments, assumptions, and adequacy of logic as well as evidence.

UNIT I: SOCIETY & HUMANE   9

Society – Human – Six Senses - Responsibilities - holistic thought – Desires - harmony in self, Relationship, society, nature, societal systems.

UNIT II: EVOLUTION OF POLITICAL THOUGHTS   9

Capitalism – Free markets, demand-supply, perfect competition, laissez-faire, monopolies, imperialism, Liberal democracy - Fascism and totalitarianism. World war I and II. Cold war - Communism – Mode of production, theory of labour, surplus value, class struggle, dialectical materialism, historical materialism, Russian and Chinese models.

UNIT III: GANDHIAN THOUGHTS   9

Gandhian thought. Swaraj, Decentralized economy & polity, Community. Control over one's lives. Relationship with nature - Welfare state. Relation with human desires. Empowered human beings, satisfaction.

UNIT IV: CIVILIZATIONS   9

History of Civilization – Indian Civilization - Essential elements of Indian civilization - Technology as driver of society, Role of education in shaping of society. Future directions.

UNIT V: MODERN ECONOMY   9

Concept of modernity - Tradition Vs Modernity – Globalization – Industrial Revolutions – Modernism and Post – Modernism.

TOTAL: 45 PERIODS

COURSE OUTCOMES: (Each unit – one outcome, total 5 outcomes)
At the end of the course, the students will be able:

COs	Course Outcome (CO)	Blooms Taxonomy
CO-1	Able to describe human, society and their interrelationships	Understand
CO-2	Able to summarize various political theories and their evolutions.	Understand
CO-3	To summarize the theory of Gandhi and his uniqueness.	Understand
CO-4	To be illustrate the formation, role and future of civilization in making of human	Apply
CO-5	To be illustrate the trends of Modern Economic Policies.	Apply

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	3	-	1	2	1	-	3
CO2	-	-	-	-	-	3	-	1	2	1	-	3
CO3	-	-	-	-	-	3	-	1	2	1	-	3
CO4	-	-	-	-	-	3	-	1	2	1	-	3
CO5	-	-	-	-	-	3	-	1	2	1	-	3

CO – PO Mapping

*For Entire Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO

TEXT BOOK:

1. Jogdand P G, Globalization and social movements : Struggle for a humane society, Jaipur Rawat Publications, 2003, ISBN: 9788170338154
2. Adam Smith, The Wealth of Nations, Fingerprint Publishing, 2018, ISBN-13: 978-9387779464

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1. Maharajan. M, Economic Thoughts of Mahatma Gandhi, Discovery Publishing Pvt.Ltd; First Edition, 2008, ISBN-13 : 978-8171414154
2. James Mill, The Elements of Political Economy, Cosimo Classics, 2007, ISBN-13 : 978-1602069800
3. Lokanathan. V., A History Of Economic Thought, S Chand & Co Ltd, 2018, ISBN-13 : 978-9352533374

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BE (CSE)10

PUCC4MC04	MANDATORY COURSES – II	L T P C
	SOCIOLOGY, SOCIETY AND CULTURE	3 0 0 3

COURSE OBJECTIVE

- To Understand the reciprocal relationship between the individual and society.
- To develop an understanding of societal and cultural dimensions of the nature of society and the environment in which they will live and work as scientists, engineers and entrepreneurs.
- To analyse problems and frame research questions relating to humans and their experience.

UNIT I: Sociology as a Science   9

Sociology and common Sense - Sociology and current affairs - Sociology as a science - Logic in sociological inquiry - Sociology of action - The field and relevance of sociology - Positivism

UNIT II: Society and Culture   9

Culture and society - The structure of culture - Cultural Traits and complexes - Subcultures and counter cultures - Cultural integration - Cultural relativism - Real and Ideal culture – Ethnocentrism - Xenocentrism - Cultural lag.

UNIT III: Social Institutions   9

The concept of varna - The Caste system: Origin and characteristics (of caste) as a system - Hierarchy based on birth - Religious sanctions on social participation - Caste and subcaste - Caste conflicts - Caste councils - An appraisal of caste system - Prospects of caste in modern India.

The Class system: What is social class? - Development of class - Self-identification and class consciousness - Class in itself and class for itself - Class having blue collar status and white collar status - Industrial class - Significance of social class.

The future of social classes: From Proletariat to status seekers

UNIT IV: Environment and Ecology   9

Conceptualising environment - Forest, ecology and society - Common Property Resources and its management - Significance of forest and environment in modern life - Environmental movement with reference to forest and water management

UNIT V: Issues of modernity   9

Concept of modernity - Tradition Vs Modernity – Globalization: Is globalization new and real? - Has globalization weakened the state? - Has globalization led to cultural homogenisation? - Does globalization lead to a clash of cultures

TOTAL: 45 PERIODS

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COURSE OUTCOMES: (Each unit – one outcome, total 5 outcomes)
At the end of the course, the students will be able:

COs	Course Outcome (CO)	Blooms Taxonomy
CO-1	Able to Describe Society in terms of science and find logic behind establishment of society.	Understand
CO-2	Able to Illustrate Society with Culture to develop the best cultural environment.	Apply
CO-3	To summarize two major revolutionary concepts of Varna: The Caste and The Class.	Understand
CO-4	Able to describe the relationship between environment and modern society.	Understand
CO-5	Able to illustrate various levels of modern issues in the evolution of society.	Apply

CO – PO Mapping

Course Outcomes	Programme Outcomes (Pos)											
	PO-1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	3	-	1	3	1	-	3
CO2	-	-	-	-	-	3	-	1	3	1	-	3
CO3	-	-	-	-	-	3	-	1	3	1	-	3
CO4	-	-	-	-	-	3	3	1	3	1	-	3
CO5	-	-	-	-	-	3	-	2	3	1	-	3

*For Entire Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO

TEXT BOOK:

1. ROSAMUND BILLINGTON, SHEELAGH STRAWBRIDGE, Culture and Society: A Sociology of Culture, Palgrave Macmillan, 1991, ISBN-13 : 978-0333460399
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