JERUSALEM COLLEGE OF ENGINEERING

(An Autonomous Institution)
Approved by AICTE & Affiliated to Anna University
Accredited by NAAC with 'A' Grade
Chennai – 600 100

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.TECH. COMPUTER SCIENCE AND BUSINESS SYSTEMS

CURRICULUM

CURRICULUM 2019
REGULATION 2021
CHOICE BASED CREDIT SYSTEM

JERUSALEM COLLEGE OF ENGINEERING
(AN AUTONOMOUS INSTITUTION AFFILIATED ANNA UNIVERSITY, CHENNAI)
B.TECH COMPUTER SCIENCE AND BUSINESS SYSTEMS
CURRICULUM 2019 -REGULATION 2021
CHOICE BASED CREDIT SYSTEM
I TO VIII SEMESTERS CURRICULUM

COURSE SUMMARY SHEET

S.No	Category	Credits as per Semester								Total Credits
		1	2	3	4	5	6	7	8	
1	HS	3	4	3	-	2	-	1	-	13
2	BS	10	6	3	3	3	-	-	-	25
3	ES	10	8	-	-	-	-	-	-	18
4	PC	-	5	14	16	11	11	8	-	65
5	PE	-	-	-	-	3	6	6	-	15
6	OE	-	-	-	3	3	3	3	-	12
7	EEC	-	-	-	1	-	3	3	10	17
TOTAL		23	23	20	23	22	23	21	10	165

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I TO VIII SEMESTERS CURRICULUM AND SYLLABI

SEMESTER 1

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	JHS1121	Communicative English and Soft Skills I	HS	4	2	0	2	3
2	JMA1102	Matrices and Multivariate Calculus	BS	4	2	2	0	3
3	JPH1101	Engineering Physics	BS	3	3	0	0	3
4	JCY1101	Engineering Chemistry	BS	3	3	0	0	3
5	JGE1101	Engineering Basics	ES	3	3	0	0	3
6	JGE1102	Programming in C	ES	3	3	0	0	3
PRACTICALS								
7	JPC1111	Physics and Chemistry Laboratory	BS	2	0	0	2	1
8	JGE1112	Programming in C Laboratory	ES	4	0	0	4	2
9	JGE1111	Design Appreciation Laboratory	ES	4	0	0	4	2
		TOTAL		**30**	**16**	**2**	**12**	**23**

SEMESTER 2

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	JHS1221	Technical English and Soft Skills II	HS	4	2	0	2	3
2	JMA1202	Linear Algebra	BS	4	2	2	0	3
3	JBE1223	Applied Science for Electronics and information Engineering	BS	4	2	0	2	3
4	JGE1201	Python Programming	ES	3	3	0	0	3
5	JCS1301	Data Structures	PC	3	3	0	0	3
6	JGE1202	Engineering Graphics & Design	ES	5	1	0	4	3
7	JNC1261	Environmental Science	NCM	3	3	0	0	0
8	JGE1209	Heritage of Tamils	HS	2	2	0	0	1
PRACTICALS								
9	JGE1211	Python Programming Laboratory	ES	4	0	0	4	2
10	JCS1311	Data Structures Lab	PC	4	0	0	4	2
		TOTAL		**36**	**18**	**2**	**16**	**23**

SEMESTER 3

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	JMA1304	Discrete Mathematics for Computer Science	BS	4	2	2	0	3
2	JCS1302	Database Management Systems	PC	3	3	0	0	3
3	JCW1301	Introduction to Business Systems	PC	3	3	0	0	3
4	JCS1403	Design and Analysis of Algorithms	PC	3	3	0	0	3
5	JCS1321 (Integrated)	Object Oriented Programming	PC	4	2	0	2	3
6	JGE1210	Tamils and Technology	HS	1	1	0	0	1
PRACTICALS								
7	JCW1311	Business Communication Laboratory I	HS	4	0	0	4	2
8	JCS1312	Database Management Systems Laboratory	PC	4	0	0	4	2
9	JPT1001	Soft Skill and Aptitude-I	EEC	2	0	0	2	*
TOTAL				28	14	2	12	20

*Only Internal Assessment

SEMESTER 4

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	JMA1405	Applied Probability and Statistics	BS	4	2	2	0	3
2	JCW1401	IP management and Entrepreneurship	PC	3	3	0	0	3
3	JCS1401	Computer Networks	PC	3	3	0	0	3
4	JCS1404	Software Engineering	PC	3	3	0	0	3
5	JCS1402	Operating Systems	PC	3	3	0	0	3
6		Open Elective-I	OE	3	3	0	0	3
PRACTICALS								
7	JCS1412	Operating Systems Laboratory	PC	4	0	0	4	2
8	JCS1411	Networks Laboratory	PC	4	0	0	4	2
9	JPT1001	Soft Skill and Aptitude- II	EEC	2	0	0	2	1
TOTAL				29	17	2	10	23

SEMESTER 5

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	JMA1501	Mathematical Modelling and Optimization Techniques	BS	4	2	2	0	3
2	JCW1501	Artificial Intelligence	PC	3	3	0	0	3
3	JCW1502	Fundamentals of Economics	PC	3	3	0	0	3
4	JCW1503	Information Management	PC	4	2	2	0	3
5		Professional Elective – I	PE	3	3	0	0	3
6		Open Elective-II	OE	3	3	0	0	3
PRACTICALS								
7	JCW1511	Artificial intelligence Laboratory	PC	4	0	0	4	2
8	JCW1512	Business Communication Laboratory II	HS	4	0	0	4	2
9	JPT1002	Technical Skills and Aptitude-I	EEC	2	0	0	2	*
TOTAL				30	16	4	10	22

*Only Internal Assessment

SEMESTER 6

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	JCW1601	Automata Theory and Compiler Design	PC	4	2	2	0	3
2	JCW1602	Fundamentals of Management	PC	3	3	0	0	3
3	JCW1603	Business Analytics	PC	3	3	0	0	3
4		Professional Elective – II	PE	3	3	0	0	3
5		Professional Elective – III	PE	3	3	0	0	3
6		Open Elective – III	OE	3	3	0	0	3
PRACTICALS								
7	JCW1611	Business Analytics Laboratory	PC	4	0	0	4	2
8	JPT1002	Technical Skills and Aptitude-II	EEC	2	0	0	2	1
9	JCS1621	Mini Project	EEC	2	0	0	2	1
10	JCS1541	Internship	EEC	-	-	-	2	1
TOTAL				27	17	4	10	23

**Internship of two weeks must be undertaken in Industry through semesters 3,4,5 leading to award of 1 credit in Semester VI

SEMESTER 7

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	JCW1701	Financial Management	PC	3	3	0	0	3
2	JCW1702	Computational Statistics	PC	3	3	0	0	3
3		Professional Elective – IV	PE	3	3	0	0	3
4		Professional Elective – V	PE	3	3	0	0	3
5		Open Elective –IV	OE	3	3	0	0	3
6	JNC1361	Essence of Indian Traditional Knowledge	NCM	3	3	0	0	0
PRACTICALS								
7	JBA1711	Entrepreneurship for Engineers	HS	2	0	0	2	1
8	JCW1711	Computational Statistics Laboratory	PC	4	0	0	4	2
9	JCS1731	Project work – Phase I	EEC	6	0	0	6	3
TOTAL				30	**18**	**0**	**12**	**21**

SEMESTER 8

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	JNC1861	Indian Constitution	NCM	3	3	0	0	0
PRACTICALS								
2	JCS1851	Comprehension and Technical Seminar	EEC	2	0	0	2	1
3	JCS1832	Project work – Phase II	EEC	18	0	0	18	9
TOTAL				**23**	**3**	**0**	**20**	**10**

TOTAL CREDITS   : 165

OPEN ELECTIVES

OPEN ELECTIVES – I

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JCW1001	An Introduction to Big Data Analytics	OE	3	3	0	0	3
2.	JCW1002	Basics of Business system	OE	4	2	0	2	3

OPEN ELECTIVES – II

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JCW1003	Introduction to Database Systems	OE	3	3	0	0	3
2.	JCW1004	Web Essentials	OE	3	3	0	0	3

OPEN ELECTIVES – III

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JCW1005	Fundamentals of Graphics	OE	3	3	0	0	3
2.	JCW1006	Business basics for Entrepreneurs	OE	3	3	0	0	3

OPEN ELECTIVES – IV

S.No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	JCW1007	Foundation of Robotics	OE	3	3	0	0	3
2.	JCW1008	Privacy and Security in online social Media	OE	3	3	0	0	3

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SEMESTER I

JHS1121	COMMUNICATIVE ENGLISH & SOFT SKILLS I	L	T	P	C
	(Common to all B.E / B. Tech Programmes)	2	0	2	3

COURSE OBJECTIVES:

- To enable the students of Engineering and Technology to develop their listening skill by learning the key techniques for comprehending information
- To facilitate the learners to speak effectively while exchanging ideas in academic and social domains
- To develop their skills in reading and understanding texts through practice
- To expose them to the correct usage of language to develop their writing skill
- To train the students to use appropriate vocabulary in academic and technical writings

UNIT I BASIC GRAMMAR I AND READING FOR INFORMATION   9

Parts of speech - Sentence patterns – Tenses - Wh- questions - Yes/no questions - Countable and Uncountable nouns - Affixation – word formation; Reading short comprehension passages - practice in skimming and scanning for specific information and note-making, Critical reading - finding key information in a given text - shifting facts from opinions and paraphrasing

SOFT SKILLS LAB   3

Listening to documentaries, inspiring speeches of great leaders, news bulletins, Ted talks, telephonic conversations

UNIT II BASIC GRAMMAR I AND SHARING INFORMATION   9

Pronouns - Adjectives - Adverbs - Imperatives - Direct and indirect questions - Compound words - Guessing meaning of words in contexts – one word substitutes; Autobiographical writing (writing about one's leisure time activities, hometown, favourite place and school life) – Biographical writing (place, people), Letter writing (informal letters)

SOFT SKILLS LAB   3

Self-introduction, peer introduction, picture description, JAM

UNIT III BASIC GRAMMAR III AND FREE WRITING I   9

Conjunctions – Prepositions - Articles - Degrees of comparison – Discourse markers - Reference words; Process description, Coherence and cohesion in writing cause and effect / compare & contrast / narrative / analytical paragraphs

SOFT SKILLS LAB   3

Language functions: Giving reasons, talking about future plans, comparing and contrasting, making

suggestions.

UNIT IV BASIC GRAMMAR IV AND LANGUAGE DEVELOPMENT 9

Subject-verb agreement - Modal verbs - Phrasal verbs - Single word substitutes - Use of abbreviations & acronyms - Cloze reading - Interpreting visual material, Jumbled sentences

SOFT SKILLS LAB 3

Interpersonal Skills: role play, group discussion, debate, conduct of meeting

UNIT V BASIC GRAMMAR V AND FREE WRITING II 9

Clause - Direct and indirect speech – Correction of errors - Word association (connotations) - Lexical items (fixed / semi fixed expressions) - Essay writing – different types of essays, dialogue writing

SOFT SKILLS LAB 3

Creative writing and speaking skills: Poster making and description, project proposals

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- Listen to different talks and lectures and understand them easily
- Communicate their thoughts confidently using communicative strategies
- Read and grasp different genres of texts effortlessly
- Write grammatically correct academic, business and technical texts
- Apply the language skills efficiently in all forms of communication

TEXTBOOKS:

1. Board of Editors, Department of English, Anna University, Chennai. Using English: A Course Book for Undergraduate Engineers and Technologists, Orient Black Swan: Chennai, 2017.
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Black Swan Publications, Chennai, 2011.
3. Raman, Meenakshi & Sangeetha Sharma, Technical Communication: English Skills for Engineers. Oxford University Press, New Delhi. 2011.

REFERENCE BOOKS:

1. Regional Institute of English. English for Engineers. Cambridge University Press, New Delhi. 2006
2. Rizvi M, Ashraf. Effective Technical Communication. Tata McGraw-Hill Publishing Company Limited, New Delhi, 2007.
3. Rutherford, Andrea J. Basic Communication Skills for Technology. Pearson Edition (II Edition), New Delhi, 2001.
4. Mandel, Steve. Effective Presentation Skills. New Delhi: Viva Books Pvt. Ltd., 2004.
5. Writing Cover Letters-Kilmet, Stephen. "Cover Letter," and "Enclosures and Attachments." In Writing for Design Professionals. New York.

WEB REFERENCES:

1. https://www.perfect-english-grammar.com

2. https://edu.gcfglobal.org/en/grammar
3. https://www.talkenglish.com/grammar/grammar.aspx
4. https://learnenglish.britishcouncil.org/skills
5. https://www.myenglishlanguage.com

EXTENSIVE READING:

Kalam, Abdul, The Wings of Fire, Universities Press, Hyderabad, 1999.

CO-PO Mapping

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

JMA1101	MATRICES AND MULTIVARIATE CALCULUS	L	T	P	C
		2	2	0	3

COURSE OBJECTIVES:

- To equip students with the knowledge of matrices required for applications in Engineering.
- To familiarize students in the applications of numerical methods to eigenvalue problems and to introduce matrix decomposition.
- To enable students to understand the concepts of multivariable functions and its calculus.
- To introduce concepts of integral calculus as tools required for applications in Engineering.
- To familiarize students in the concepts of vector calculus and its applications.

UNIT I   **MATRICES**   **12**

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices by orthogonal transformations – Reduction of a quadratic form to canonical form – Nature of quadratic forms.

UNIT II   **EIGENVALUE PROBLEMS AND MATRIX DECOMPOSITION**   **12**

Eigenvalue problems: Power method, Jacobi rotation method – Cholesky decomposition – QR decomposition – LU decomposition – Singular value decomposition.

UNIT III   **FUNCTIONS OF SEVERAL VARIABLES**   **12**

Partial differentiation – Total derivative – Jacobians – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT IV   **APPLICATIONS OF INTEGRAL CALCULUS**   **12**

Improper integrals: Beta and Gamma Integrals – Definitions and properties – Simple problems.Multiple integrals: Double integrals over general regions – Cartesian coordinates – Polar coordinates – Change of order of integration – Change of variables – Area enclosed between plane curves – Triple integrals – Volume of solids.

UNIT V   **VECTOR CALCULUS**   **12**

Vector Differentiation: Gradient and directional derivative – Divergence and curl - Vector identities – Irrotational and Solenoidal vector fields Vector Integration: Line and surface integrals – Green's theorem – Gauss and Stoke's theorems – Verification and evaluation in simple problems.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, students will be able

CO1: To understand applications of matrix theory in quadratic forms.

CO2: To use numerical methods for solving eigenvalue problems and to perform various matrix decompositions.

CO3: To use calculus for problems and applications dealing with functions of several variables.

CO4: To gain insight on the applications of multiple integrals in area and volume problems.

CO5: To understand concepts of vector calculus and evaluate line and surface integrals.

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
3. Weir, M.D and Joel Hass, "Thomas Calculus", 12th Edition, Pearson India, 2016.
4. P.Anuradha and V.Sudhakar, "Matrices and Calculus", Scitech Publications, 1st Edition, Chennai, 2019.

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, 3rd Edition, 2007.
3. Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.

WEB REFERENCES:

1. **https://nptel.ac.in/courses/111108157/**
2. **https://nptel.ac.in/courses/111107108/**
3. **https://nptel.ac.in/courses/111104144/**
4. **https://nptel.ac.in/courses/111105122/**

CO-PO MAPPINGS:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	2	-	-	2
CO2	3	3	2	2	-	-	-	-	2	-	-	2
CO3	3	3	2	2	-	-	-	-	2	-	-	2
CO4	3	3	2	2	-	-	-	-	2	-	-	2
CO5	3	3	2	2	-	-	-	-	2	-	-	2
AVG	3	3	2	2	-	-	-	-	2	-	-	2

JPH1101	**ENGINEERING PHYSICS** **(Common to all B.E / B.Tech Programmes)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES:
- To enable the students to understand the basics in crystals structure
- To enable the students to understand the basic concepts in properties of matter
- To impart knowledge in ultrasonic inspections
- To introduce the principles of quantum mechanics
- To impart knowledge of laser and fiber optic communication

UNIT I CRYSTAL PHYSICS   **9**

Single crystal, Polycrystalline and Amorphous materials – Single Crystals: Unit cell, Crystal systems, Bravais lattices, Directions and Planes in a crystal, Miller indices – Inter planar distances – Coordination number and Packing factor for SC, BCC, FCC, HCP and Diamond structures - Crystal imperfections: Point defects, Line defects – Burgers vector, Stacking faults

UNIT II   PROPERTIES OF MATTER   **9**

Elasticity – Stress-strain diagram and its uses - factors affecting elastic moduli and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - stress due to bending in beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment

UNIT III   ULTRASONICS   **9**

Production of ultrasound by Magneto-striction effect and Piezoelectric effect Detection of ultrasonic wave – Properties of ultrasonic wave – Acoustic grating - Industrial applications – Drilling, Welding, Soldering and Cleaning – SONAR - Non Destructive Testing – Pulse echo system through Transmission and Reflection modes- A, B and C–scan displays.

UNIT IV   PHOTONICS AND FIBRE OPTICS   **9**

Spontaneous and stimulated emission-Population inversion -Einstein's A and B coefficients derivation – Laser Principle - Semiconductor lasers (homojunction & heterojunction) - Optical Fiber: types (material, refractive index, mode) - Propagation of light in optical fibers – Numerical aperture and Acceptance angle –attenuation, dispersion, bending -Fiber Optical Communication system (Block diagram) -Active and passive fiber sensors-Endoscope.

UNIT V QUANTUM PHYSICS   **9**

Black body radiation –Planck's theory (derivation) –Deduction of Wien's displacement law and Rayleigh –Jeans' Law from Planck's theory –Compton effect-theory –Properties of Matter waves – G.P Thomson experiment -Schrödinger's wave equation –Time independent and time dependent equations –Physical significance of wave function –Particle in a one dimensional box -Scanning electron microscope -Transmission electron microscope

                                                                                    TOTAL: 45 PERIODS

COURSE OUTCOMES:

Students will be able

- To enhance knowledge on properties of matter
- To assess the properties of ultrasonics and imaging devices
- To understand and to compute problems in Quantum Physics.
- To learn the use of modern optical fiber communication systems and tools in real life applications.
- To gain more insight on the functioning of optical materials for optoelectronics.

TEXT BOOKS:

1. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.
2. Gaur, R.K. & Gupta, S.L. "Engineering Physics". Dhanpat Rai Publishers, 2012.
3. Dr.BeulaShanthi, John, Dr.P.mani, "Engineering Physics", Dhanam Publications, First Edition, 2019.

REFERENCES:

1. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
2. Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers". Cengage Learning, 2010.
3. Tipler, P.A. &Mosca, G. "Physics for Scientists and Engineers with Modern Physics'.W.H.Freeman, 2007
4. Rajendran V, "Engineering Physics", Tata McGraw Hill, 2009.
5. John D.Cutnell, "Cutnell and Johnson Physics", Willey Publications, 2018.

WEBSITE REFERENCES:

1. https://nptel.ac.in/courses/115/104/115104109/
2. https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-ce18/
3. https://onlinecourses.nptel.ac.in/noc21_bt50/preview
4. https://nptel.ac.in/courses/115/104/115104096/
5. https://nptel.ac.in/courses/108/104/108104113/

CO-PO Mapping

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

JCY1101	ENGINEERING CHEMISTRY (Common to all B.E / B.Tech Programmes)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To acquaint the student with concepts of photochemistry and analytical techniques.
- To make the students conversant with boiler feed water and water treatment techniques.
- To make the students acquire sound knowledge in corrosion of materials.
- To understand polymer chemistry and the principle of energy in batteries.
- To impart knowledge on the basics of nano materials and engineering materials.

UNIT I: PHOTOCHEMISTRY AND ANALYTICAL TECHNIQUES   9
Photochemistry- Laws of photochemistry - Grotthuss–Draper law, Stark–Einstein law and Lambert-Beer Law (problems). Photo processes - Internal Conversion, Inter-system crossing, Fluorescence and its applications in medicine – Phosphorescence-Chemiluminescence and Photo-sensitization.
Analytical Techniques – UV-visible spectroscopy – principles – instrumentation (block diagram only) – Colorimetry- Principle-Instrumentation, estimation of iron by colorimetry – Flame photometry – principle – Instrumentation – estimation of sodium by Flame photometry.

UNIT II WATER TECHNOLOGY   9
Hardness-Units of Hardness- Temporary hardness-Permanent hardness- Estimation hardness by EDTA method- Alkalinity – Types- water quality parameters (pH, EC, TDS, DO, BOD, COD) –- Boiler feed water-requirements- boiler troubles (scale and sludge- caustic embrittlement-boiler corrosion-priming and foaming) - softening of hard water -external treatment (zeolite and demineralization) - internal treatment (phosphate, calgon, carbonate, colloidal) -- desalination of brackish water –reverse osmosis.

UNIT III ELECTROCHEMISTRY AND CORROSION   9
Electrochemistry- Electrochemical cell - redox reaction, electrode potential- oxidation potential-reduction potential, measurement and applications - electrochemical series and its significance - Nernst equation (derivation and problems).
Corrosion- causes- types-chemical, electrochemical corrosion- galvanic corrosion-differential aeration corrosion (pitting, waterline, wire fence, pipeline, crevice, stress corrosion), Factors influencing the rate of corrosion- corrosion control - material selection and design aspects – cathodic protection methods (sacrificial anode and impressed current cathodic methods)- Electroplating of Copper and electroless plating of nickel-corrosion inhibitors (anodic and cathodic inhibitors).

UNIT IV   POLYMER, COMPOSITES AND ENERGY STORAGE DEVICES   9
Introduction- Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization.. Biodegradable polymer- Types- synthetic methods – applications of biodegradable polymers. Polymer composites and its application.
Energy Storage Devices - Batteries and fuel cells: Types of batteries – primary battery (dry cell) secondary battery (lead acid battery, nickel-cadmium battery, lithium-ion-battery). Fuel cell – H_2-O_2 fuel cell- solid oxide fuel cell - polymer electrolyte membrane fuel cell (PEMFC) applications.

UNIT V ENGINEERING MATERIALS AND NANOCHEMISTRY   9

Engineering Materials- Refractories – classification – acidic, basic and neutral refractories – properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) – manufacture of alumina, magnesite and zirconia bricks. Cement – manufacture and properties - setting and hardening of cement, special cement- waterproof and white cement–properties and uses.

Nanochemistry – Introduction – distinction between molecules, nanoparticles and bulk materials; Synthesis: precipitation, thermolysis, hydrothermal, solvothermal, electrodeposition, chemical vapour deposition, laser ablation; Properties and applications.

TOTAL: 45 PERIODS

COURSE OUTCOMES
Students will be able to
- Understand laws of photochemistry and principles of instrumentation and their applications in various fields.
- To understand the basic principle of water treatment and techniques involved in the purification process for future learning.
- Apply electrochemical reactions on the process of corrosion and its prevention methods.
- Gain knowledge on biodegradable polymers and understand the principle of batteries for development of new energy resources.
- Gain knowledge on engineering materials and understand the unique behavior of nanomaterials.

TEXT BOOKS:
1. Jain P.C. and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2010.
2. R.Gopalan, D.Venkayya, SulochnaNagarajan, Textbook of Engineering Chemistry, Vikas publishing pvt ltd, 4th edition, 2013.
3. Dr.N.JohnJebarathinamDr.R.VaidyanathanMs.A.U.AjishaDr.A.Ravikrishnan, Engineering Chemistry, Sri Krishna Publications, First edition 2019.

REFERENCES:
1. O.G.Palanna, Engineering Chemistry, McGraw Hill, 2017
2. Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2013.
3. Gowariker V.R. , Viswanathan N.V. and Jayadev Sreedhar, "Polymer Science", New Age International P (Ltd.,), Chennai, 2006.
4. Ozin G. A. and Arsenault A. C., "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.
5. B.R.Puri, L.R.Sharma, Madan S.Pathana, Principle of physical chemistry, 47th edition, Vishal publishing Co, 2017.

WEBSITE REFERENCES:
1. https://nptel.ac.in/content/storage2/courses/103108100/module2/module2.pdf
2. https://www.samcotech.com/what-is-a-boiler-feed-water-treatment-system-how-does-it-work/
3. https://nptel.ac.in/courses/113/101/113101098/
4. https://nptel.ac.in/courses/112/107/112107221/
5. https://nptel.ac.in/courses/113/106/113106093/

CO-PO MAPPING

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

JGE1101	ENGINEERING BASICS (Common to all B.E /B.TechProgrammes)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To impart knowledge on the basics of Civil Engineering to the students.
- To impart knowledge on the basics of Mechanical Engineering to the students.
- To impart knowledge on the electric circuits and working principles of Electrical Machines.
- To impart knowledge on the Principles and characteristics of various electronic devices.
- To impart knowledge on the basics of various measuring instruments.

UNIT 1 BASICS OF CIVIL ENGINEERING   11
Introduction to Civil Engineering, Types of buildings, components of a residential building, Building Materials, Types of slabs, beam, column, lintel, floor and foundation - Types of roofs.
Surveying and Levelling - Linear and Angular Measurements - Introduction to transport system, role of transportation in society - Green Highway.
Sources of water, Hydrological cycle, Irrigation Engineering, Rain water harvesting, Environmental pollution, Greenhouse gas emission, Ozone depletion, Global warming - Green building concepts.

UNIT 2 BASICS OF MECHANICAL ENGINEERING   11
Introduction to the concepts of Mechanization and Automation, Robotics - Manufacturing methods - casting, machining, forming operations, Introduction to IC Engine - Working principles of four stroke petrol and diesel engines, Types of power plants - Hydel power plant and thermal power plant, Steam generators - Fire tube boiler and water tube boiler, Thermal systems - Heat exchangers, Radiator and oil cooler, Design of ingenious mechanisms - Parts feeding mechanism.

UNIT 3 ELECTRIC CIRCUITS AND ELECTRICAL MACHINES   7
Basic circuit components - Ohms Law - Kirchhoff's Law-Introduction to AC circuits-waveforms and RMS value - Power and power factor-Principles of operation and characteristics of DC machines-Transformers-Three phase and single-Phase induction motors.

UNIT 4 ELECTRONIC DEVICES & CIRCUITS   7
Types of Materials - Silicon & Germanium - N type and P type materials - Construction and Characteristics: PN Junction diode - Zener Diode - Bipolar Junction Transistor - Field effect Transistors - IGBT - Introduction to operational amplifier - Inverting Amplifier - Non-inverting Amplifier.

UNIT 5 MEASUREMENTS & INSTRUMENTATION   9
Elements of generalized measurement system - Basic terminologies: Accuracy, precision, resolution, sensitivity, linearity, span and range - Errors in measurement - Standards of measurement - calibration - Operating forces: Deflection force, controlling force, damping force - Classification of instruments.

TOTAL: 45 PERIODS

COURSE OUTCOMES

The students will be able to

- Gain knowledge on the various fields of Civil Engineering.
- Know the fundamentals of Mechanical Engineering.
- Understand the basic concepts of electric circuits and working principles of electrical machines.
- Gain knowledge on the basics of electronics and apply them in practical situations.
- Choose appropriate instruments for electrical measurement for a specific application.

TEXT BOOKS

1. Shanmugam G and Palanichamy MS, " Basic Civil and Mechanical Engineering", Tata McGraw Hill publishing Co., 2016
2. Venugopal K. and Prahu Raja V., Basic Mechanical Engineering, Anuradha Publishers, Kumbakonam, 2000.
3. D P Kothari and I.J Nagarath, Electrical Machines - Basic Electrical and Electronics Engineering, McGraw Hill Education (India) Private Limited, Third Reprint, 2016.

REFERENCES:

1. Palanikumar, K. Basic Mechanical Engineering, ARS Publications, 2010.
2. RamamruthamS, Basic Civil Engineering, Dhanpat Rai Publishing Co.(P) Ltd.1999.
3. Thereja .B.L., Fundamentals of Electrical Engineering and Electronics , S. Chand & Co. Ltd., 2008.
4. A.K. Sawhney, A Course in Electrical & Electronic Measurements & Instrumentation, Dhanpat Rai and Co, New Delhi, 2010.
5. H.S. Kalsi, Electronic Instrumentation, Tata McGraw-Hill, New Delhi, 2010.

WEBSITE REFERENCES:

1. https://www.eit.edu.au/
2. https://nptel.ac.in/courses/105/102/105102088/
3. https://nptel.ac.in/courses/108/105/108105155/
4. https://nptel.ac.in/courses/117/103/117103063/
5. https://nptel.ac.in/courses/108/105/108105153/

CO-PO MAPPING

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

JGE1102	**PROGRAMMING IN C** **(Common to all B.E / B.Tech Programmes)**	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To learn Fundamentals of computing
- To be able to use file operations in C
- To implement programs using basic features of C
- To learn to use C pointers and dynamically allocated memory techniques
- To learn advanced features of the C programming language

UNIT I INTRODUCTION TO PROBLEM SOLVING   9

Simple model of a Computer – Hardware – Software – Data Representation, Problem Solving Techniques – Bottom up design and top down design - applications, Introduction to Algorithms and Flow Chart - Notion of memory, addresses, variables, instructions, execution of instruction- Operating system commands, file editing, compiling, linking, executing a program.

UNIT II C PROGRAMMING   9

Introduction to 'C' programming – structure of a 'C' program – compilation and linking processes. Conversion of simple algorithm to program-Constants, Variables – Data Types – Expressions using operators in 'C' – Managing Input and Output operations – Decision Making and Branching – Looping statements – solving simple scientific and statistical problem.

UNIT III ARRAYS AND STRINGS   9

Arrays – Initialization – Declaration – One dimensional and two dimensional arrays - String- String operations –Arrays of strings.

UNIT IV FUNCTIONS AND USER DEFINED DATA TYPES   9

Function – definition of function – Declaration of function – Pass by value - Pass by reference– Command Line Argument in C-- Recursion - Enumerators – Structures - Unions.

UNIT V POINTERS AND FILES   9

Macros - storage classes - Pointers- Definition – Initialization – Pointers arithmetic – Double Pointers, Basic file operations-Example problems.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Design and represent solutions to problems as algorithm and flow chart
- Write simple C Programs using loops and conditional statements
- Write simple C Programs using arrays
- Write simple C Programs using functions
- Write simple C codes using pointers, structures and union

TEXT BOOKS:

1. Pradip Dey, Manas Ghosh, "Programming in C", First Edition, Oxford University Press, 2018
2. Byron S Gottfried, "Programming with C", Schaum's Outlines, Third Edition, McGraw- Hill, 2010.

REFERENCES:

1. Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2015.
2. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2011.
3. Paul J Deitel, Dr. Harvey M. Deitel,"C How to Program", Seventh Edition, Pearson Education, 2016.
4. E. Balagurusamy, "Computing Fundamentals and C Programming", McGraw-Hill Publishing Company Limited, (2008).
5. Brian W. Kernighan and Rob Pike, "The Practice of Programming" (Chap 1), Pearson Education, 2008

WEBSITE REFERENCES

1. https://www.javatpoint.com/computer-fundamentals-tutorial
2. https://www.geeksforgeeks.org/basics-file-handling-c/
3. https://www.studytonight.com/c/string-and-character-array.php
4. https://www.tutorialspoint.com/cprogramming/c_functions.htm
5. https://www.guru99.com/c-pointers.html

CO-PO MAPPING

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

JPC1111	PHYSICS AND CHEMISTRY LABORATORY (Common to all B.E / B.Tech Programmes)	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

- To provide students the firsthand experience of verifying various concepts learnt in theory courses.

LIST OF EXPERIMENTS:

PHYSICS

1. Determination of Young's modulus for the given uniform bar by uniform bending method
2. Determination of wavelength of the diode laser and hence determine the size of the coated powder particle
3. Determination of velocity of Ultrasound using Ultrasonic interferometer and also find the compressibility of the given liquid
4. Determination of moment of inertia of the given circular disc and rigidity modulus of the metal wire using torsional pendulum
5. Determination of Planck' constant using different color filters
6. Determination of Wavelength of spectral lines in mercury spectrum using spectrometer
7. Analysis of I-V Characterization of Solar cell

TOTAL: 15 PERIODS

LIST OF EXPERIMENTS

CHEMISTRY

1. Estimation of HCl using Na_2CO_3 as primary standard and determination of alkalinity in water samples.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper in brass by Iodometry.
6. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

TOTAL: 15 PERIODS

COURSE OUTCOMES:

Students will be able to

1. Acquire experience in analyzing the elastic materials.
2. Understand the acoustic properties of various liquids.
3. Acquire knowledge in optical properties of solids.
4. Make the student acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
5. Acquaint the students with the determination of molecular weight of a polymer by viscometry.

REFERENCES:

1. Practical Fiber Optics, D. Bailey and E. Wright, 2003.
2. Jerrad H.G. and Mc Neil D.B. -Theoretical and Experimental Physics.
3. Fretter W.B. -Introduction to Experimental Physics, Blackiee.
4. J. Mendham, RC Denney, JD Barnes, MJK Thomas, Text book of Quantitative Chemical Analysis, Vogel's, 2008.

WEBSITE REFERENCES

1. http://www.digimat.in/nptel/courses/video/105107176/L31.html
2. https://www.canterbury.ac.nz/media/documents/science-outreach/chloride_mohr.pdf
3. http://www.mgcub.ac.in/pdf/material/20200428101433e562a8b8e8.pd
4. http://depthome.brooklyn.cuny.edu/physics/lab/phy2/newlabs/Diffraction-grating-ver-2.pdf
5. http://web.physics.ucsb.edu/~phys128/experiments/interferometry/measuring_wavelength.pdf

CO-PO MAPPING

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

JGE1112	**PROGRAMMING IN C LABORATORY** **(Common to all B.E / B.Tech Programmes)**	**L**	**T**	**P**	**C**
		0	0	4	2

COURSE OBJECTIVES:
The students should be made to:
- To be exposed to the syntax of C
- To be familiar with programming in C
- To learn to use arrays, strings, functions, pointers, structures and unions in C.
- To Learn the fundamentals of File Programming in C
- To solve simple problems using C

LIST OF PROGRAMS
1. Usage of Basic Linux commands
2. C Programming using Simple statements and expressions
3. Scientific problem solving using decision making and looping.
4. Simple programming for one dimensional and two dimensional arrays.
5. Solving problems using Strings
6. C Programming using Pointers
7. C Programming using user defined functions (Pass by value and Pass by reference)
8. C Programming using Recursion
9. C Programming using structures and union
10. C Programming using enumerated data types
11. C Programming using macros and storage classes
12. C Programming using Files

TOTAL: 60 PERIODS

COURSE OUTCOMES:
At the end of the course, the student should be able to:
- Write simple C Programs
- Able to solve scientific problems using C
- Gain knowledge on the use of functions and arrays
- Use structures, pointers and files in C Programs
- Develop modularized applications in C

TEXT BOOKS:
1. Pradip Dey, Manas Ghosh, "Programming in C - As per the latest AICTE syllabus", First Edition, Oxford University Press, 2018.
2. Byron S Gottfried, "Programming with C", Schaum's Outlines, Third Edition, McGraw- Hill, 2010.

WEBSITE REFERENCES
1. https://www.javatpoint.com/first-c-program

2. https://www.w3resource.com/c-programming-exercises/
3. https://www.javatpoint.com/functions-in-c
4. https://www.programiz.com/c-programming/c-structures-pointers
5. https://www.sitesbay.com/cprogramming/c-applications

CO-PO MAPPING

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

JGE1111	**DESIGN APPRECIATION LABORATORY** (Common to all B.E / B.Tech Programmes)	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To provide exposure to the students with hands-on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.
- To kindle your own creativity, ideation and realize the importance of team working.
- To gain knowledge through experience in handling of engineering aggregates.
- To appreciate the use of various mechanisms involved in engineering products.
- To understand the interactions between its subsystems and their functionality.

GROUP A (CIVIL & MECHANICAL)
I CIVIL ENGINEERING PRACTICE   13
Buildings:
(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:
(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
(b) Study of pipe connections requirements for pumps and turbines.
(c) Preparation of plumbing line sketches for water supply and sewage works.
(d) Hands-on-exercise: Basic pipe connections - Mixed pipe material connection – Pipe connections with different joining components.
(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:
(a) Study of the joints in roofs, doors, windows and furniture.
(b) Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

MECHANICAL ENGINEERING PRACTICE   18
Welding:
(a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
(b) Gas welding practice

Basic Machining:
(a) Simple Turning and Taper turning
(b) Drilling Practice

Sheet Metal Work:
(a) Forming & Bending:
(b) Model making - Trays and funnels.
(c) Different type of joints.

Machine Assembly Practice:
(a) Study of centrifugal pump
(b) Study of air conditioner

Demonstration on:
   (a) Smithy operations, upsetting, swaging, setting down and bending. Example - Exercise - Production of hexagonal headed bolt.
   (b) Foundry operations like mould preparation for gear and step cone pulley.
   (c) Fitting - Exercises - Preparation of square fitting and V - fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)
I ELECTRICAL ENGINEERING PRACTICE   13
   1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
   2. Fluorescent lamp wiring.
   3. Stair case wiring
   4. Measurement of electrical quantities - voltage, current, power & power factor in RLC circuit.
   5. Measurement of energy using single phase energy meter.
   6. Measurement of resistance to earth of electrical equipment.

II ELECTRONICS ENGINEERING PRACTICE   16
   1. Study of Electronic components and equipments - Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
   2. Study of logic gates AND, OR, EX - OR and NOT.
   3. Generation of Clock Signal.
   4. Soldering practice - Components Devices and Circuits - Using general purpose PCB.
   5. Measurement of ripple factor of HWR and FWR.

                                                          TOTAL: 60 PERIODS
COURSE OUTCOMES:
On successful completion of this course, the student will be able to
   ● Fabricate carpentry components and pipe connections including plumbing works.
   ● Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundry and fittings.
   ● Carry out basic home electrical works and appliances.
   ● Measure the electrical quantities.
   ● Elaborate on the components, gates, soldering practices.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
CIVIL
   1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible   pipes, couplings, unions, elbows, plugs and other fittings. 15 Sets
   2. Carpentry vice (fitted to work bench) 15 Nos
   3. Standard woodworking tools 15 Sets
   4. Models of industrial trusses, door joints, furniture joints 5 each
   5. Power Tools:
        (a)Rotary Hammer 2 Nos
        (b)Demolition Hammer 2 Nos
        (c)Circular Saw 2 Nos
        (d)Planer 2 Nos

(e) Hand Drilling Machine 2 Nos

(f) Jigsaw 2 Nos

MECHANICAL

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

ELECTRICAL

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

ELECTRONICS

1. Soldering guns 10 Nos
2. Assorted electronic components for making circuits 50 Nos
3. Small PCBs 10 Nos
4. Multimeters 10 Nos
5. Study purpose items: Telephone, FM radio, low-voltage power supply

WEBSITE REFERENCES:

1. www.vikaspublishing.com/engineering-practices-lab
2. https://archieve.org/mechanicalengineeeringworkshoplaboratory

CO-PO MAPPING

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

SEMESTER II

JHS1221	TECHNICAL ENGLISH & SOFT SKILLS II (Common to all B.E / B.Tech Programmes)	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

- To make the students of engineering and technology enhance their ability to read and comprehend different texts
- To improve their creative and critical thinking so as to use in demanding contexts
- To equip the learners with the skills of writing convincing job applications and effective reports
- To develop their speaking skills to make technical presentations and participate in group discussions
- To facilitate them to hone their soft skills

UNIT I TECHNICAL WRITING AND VISUAL CONVERSION   6

Definitions, Purpose statements, Technical vocabulary, regular and irregular verbs - Process Description and Interpretation of Graphs and Charts

SOFT SKILLS LAB   3

Skimming and scanning, understanding logic and sequencing in reading, inferring the exact meaning of text, making out meaning of pictorial and graphical representations

UNIT II TECHNICAL WRITING AND GUIDELINES PREPARATION   6

Conditional clauses, Numerical adjectives, Collocation, verbal analogies -Instructions, Recommendations, Checklist

SOFT SKILLS LAB   3

Comprehensive listening: Listening to telephonic conversations, listening to native accents, short and long conversations from different domains, listening to various pre-recorded conversations and speeches

UNIT III   9
SOFT SKILLS LAB

Listening and speaking practice based on BEC, IELTS and TOEFL

UNIT IVTECHNICAL WRITING AND BUSINESS LETTERS   6

Cause and effect, impersonal passive voice, idioms and phrases, words used as nouns and verbs -- Letter writing – job application, business correspondence (letters) - calling for quotations, placing order, complaint letters, preparing a memo, notice and e-mail – itinerary

SOFT SKILLS LAB   3

Group Discussions - Process, Skills, Guidelines, Evaluation, Oral Presentation – Planning, Preparing, Organizing, Presenting

UNIT VTECHNICAL WRITING AND REPORT WRITING   6
Degrees of comparison, editing, Email etiquette, Misspelled words -- Report writing: survey, feasibility, industrial visit, reporting various incidents and accidents, Minutes of meeting
SOFT SKILLS LAB   3
Starting a Career – vision statement, preparing logo and tagline, making short term and long term goals, setting plans

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On the completion of the course, students will be able to
- Read and understand general and technical texts
- Apply creative and critical thinking and communicate their ideas efficiently
- Participate in group discussions and deliver short speeches effectively
- Write effectively and persuasively in academic and workplace contexts
- Face the future challenges confidently and successfully

TEXTBOOKS:
1. Department of English, Anna University, Chennai. Mindscapes: English for Technologists and Engineers. Orient Black Swan, Chennai, 2012.
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Black Swan Publications, Chennai, 2011.
3. Rizvi, M. Ashraf, "Effective Technical Communication", Tata McGraw – Hill, 2006.

REFERENCE BOOKS:
1. Ibbotson, Mark, "Cambridge English for Engineering", Cambridge University Press, 2008.
2. English, Laura M & Sarah Lynn, "Business Across Cultures: Effective Communication Strategies", Addison Wesley, 1995.
3. Richard Johnson-Sheehan, "Technical Communication Today" 4th Edition Books Longman Publishing Group, 2011.
4. Porter, Patricia A., and Margaret Grant, "Communicating Effectively in English: Oral Communication for Non-Native Speakers", 2nd Edition, Wadsworth, 1992.
5. Gopalaswamy, Ramesh & Ramesh Mahadevan. ACE of Soft Skills: Attitude, Communication and Etiquette for Success, New Delhi: Pearson, 2010.

WEB LINKS:
1. https://learnenglish.britishcouncil.org/business-english
2. https://www.thebalancecareers.com
3. https://www.deakin.edu.au/students/studying/study-support/academic-skills/report-writing
4. https://www.englishclub.com
5. https://www.ielts.org

EXTENSIVE READING:
Wells, H.G. The Time Machine, Peacock, India, 2008.

CO-PO MAPPING:

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

JMA1202	LINEAR ALGEBRA	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:
- To impart knowledge of consistency of system of equations through Rouche-Capelli theorem and numerical techniques.
- To familiarize students in the concepts of vector spaces, bases and dimension.
- To help students understand concepts of linear transformation, Eigen values, Eigen vectors and Diagonalizability.
- To introduce inner product spaces, orthogonalization and least square approximations.

UNIT I MATRICES AND SYSTEM OF LINEAR EQUATIONS   **12**
Matrices – Row Echelon form – Reduced Row Echelon form - Rank – Non-homogeneous system of linear equations – Homogeneous system of linear equations – Rouche-Capelli theorem (without proof) – Consistency – Gauss Jordan method – Gauss Seidel method.

UNIT II VECTOR SPACES   **12**
Definition of field – Vector spaces – Subspaces – Properties – Linear combinations – Linear independence and linear dependence – Span – Bases and dimensions.

UNIT III LINEAR TRANSFORMATION   **12**
Linear transformation – Properties - Kernel and Image – One-to-One and Onto transformations – Rank and Nullity – Dimension theorem.

UNIT IV DIAGONALIZATION   **12**
Matrix representations of linear transformations - Eigenvalues and eigenvectors - Diagonalizability.

UNIT V INNER PRODUCT SPACES   **12**
Inner products and norms – Gram Schmidt orthogonalization process – Adjoint of a linear operator – Least square approximation.

      TOTAL: 60 PERIODS

COURSE OUTCOMES:
At the end of the course, students will be able
CO1: To understand applications of Rouche-Capelli theorem and numerical methods in system of equations.
CO2: To apply fundamentals concepts of advanced algebra in modern mathematics.
CO3: To understand concepts and methods in Linear transformations.
CO4: To demonstrate efficient use of matrix representations and diagonalization.
CO5: To solve problems using orthogonalization process and use least square approximations in engineering applications.

TEXT BOOKS:
1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.

3. Friedberg, A.H., Insel, A.J. and Spence, L., ―Linear Algebra, Prentice Hall of India, New Delhi, 2004.

REFERENCES:

1. Burden, R.L. and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. James, G. ―Advanced Modern Engineering Mathematics, Pearson Education, 2007.
3. Kolman, B. Hill, D.R., ―Introductory Linear Algebra, Pearson Education, New Delhi, First Reprint, 2009.
4. Kumaresan, S., ―Linear Algebra – A Geometric Approach, Prentice – Hall of India, New Delhi, Reprint, 2010.
5. Lay, D.C., ―Linear Algebra and its Applications, 5th Edition, Pearson Education, 2015.
6. O'Neil, P.V., ―Advanced Engineering Mathematics, Cengage Learning, 2007.
7. Strang, G., ―Linear Algebra and its applications, Thomson (Brooks/Cole), New Delhi, 2005.
8. Sundarapandian, V. ―Numerical Linear Algebra, Prentice Hall of India, New Delhi, 2008.

WEB REFERENCES:
1. https://nptel.ac.in/courses/111107105/
2. https://nptel.ac.in/courses/108104174/
3. https://nptel.ac.in/courses/111104137/
4. https://nptel.ac.in/courses/111106135/
5. https://nptel.ac.in/courses/111108157/

CO-PO MAPPING

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

JBE1223	**APPLIED SCIENCE FOR ELECTRONICS AND INFORMATION ENGINEERING**	**L**	**T**	**P**	**C**
		2	**0**	**2**	**3**

COURSE OBJECTIVES
- To understand the essential principles of semiconductor device and Electron transport properties.
- To understand the essential principles of magnetic properties of materials.
- To understand the essential principles of optical properties of materials.
- To compare the basic concepts of hybridization with chemical bonding.
- To understand the principles in various analytical techniques.

UNIT I SEMICONDUCTING MATERIAL 7
Intrinsic semiconductor – Carrier concentration – Fermi level – Variation of Fermi level with temperature – Electrical conductivity – Band gap determination – Compound semiconductors -Direct and Indirect band gap- Carrier concentration in N-type and P-type semiconductor – Variation of Fermi level with temperature and Impurity concentration .

UNIT II MAGNETIC AND SUPERCONDUCTING MATERIALS 7
Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism – Domain theory – Hysteresis – Soft and Hard magnetic materials– Ferrites and its applications - Superconductivity: properties – Type I and Type II superconductors – BCS theory of superconductivity (Qualitative) – High Tc superconductors .

UNIT III OPTICAL PROPERTIES OF MATERIALS 7
Classification of Optical materials - metals, insulators and semiconductors) – Carrier generation and Recombination processes - Absorption emission and Scattering of light (concepts only) - Photo current in a P-N diode – Solar cell - LED – Organic LED.

UNIT IV CHEMICAL BONDING AND CONDUCTIVITY IN SOLIDS 10
Band theory - Salient feature-Application of band theory (conductor, semiconductor, insulator)- Semiconductor- Types (intrinsic and extrinsic) - Band energy levels for pure silicon crystal, band model of n-type and p-type semiconductance of silicon. Types - Nonelemental semiconductor, Defect semiconductor, Chalcogen semiconductor (definition, properties). Preparation of Germanium- Fractional distillation and crystal growth methods. Fullerenes-preparation, properties and applications. Conducting polymer-Types-mechanism of conduction (polyacetylene) - polyaniline - properties, applications.

UNIT V INSTRUMENTAL METHODS OF ANALYSIS 9
Thermal analysis techniques- Thermo gravimetric analysis and Differential thermal analysis- Principle, instrumentation and applications - Concept of chromatography – Principle, instrumentation and applications of Paper chromatography, Column chromatography, Thin layer chromatography and Gas chromatography. Principle and applications of Conductometric titrations, Potentiometric titrations and pH-metry.

PHYSICS LABORATORY

LIST OF EXPERIMENTS: (ANY 5)   **10**

1. Determination of dispersive power of the given solid prism using spectrometer
2. Determination of thickness of the given thin material by forming interference fringes using air- wedge setup
3. Analysis of I-V Characterization of Solar cell
4. Determination of energy gap of the given semiconductor by plotting the graph between current and temperature
5. Determination of acceptance angle of the given fiber cable.
6. Determination of Young's modulus for the given uniform bar by nonuniform bending method

CHEMISTRY LABORATORY

LIST OF EXPERIMENTS (ANY 5)   **10**

1. Determination of strength of hydrochloric acid using pH meter.
2. Determination of strength of acids in a mixture of acids using conductivity meters.
3. Conductometric titration of strong acid vs strong base.
4. Estimation of iron content using potentiometer.
5. Estimation of iron content of the water sample using spectrophotometer (thiocyanate method).
6. Estimation of sodium and potassium present in water using a flame photometer.
7. Determination of SAP and FAV values of an oil.
8. Estimation of acetic acid adsorbed on charcoal

TOTAL: 60 PERIODS

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

- Acquire knowledge on basics of conductivity of solids, semiconductor physics and its applications in various devices.
- Get knowledge on magnetic properties of materials and their applications in data storage
- Have the necessary understanding on the functioning of optical materials for
- Optoelectronics Acquainted   with hands-on knowledge in the quantitative chemical analysis through instrumental analysis
- Acquire practical knowledge on interference pattern, semiconductor devices, solar cells and instrumental analysis of acids, bases and heavy metals.

TEXT BOOKS

1. Kasap, S.O.- Principles of Electronic Materials and Devices, McGraw, Education, 2007.
2. Jasprit Singh, Semiconductor Devices: Basic Principles, Wiley 2012.
3. Kittel, C. Introduction to Solid State Physics. Wiley, 2005.
4. Umesh K Mishra &Jasprit Singh, "Semiconductor Device Physics and Design", Springer, 2008.
5. Jain P.C. and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2010.

REFERENCES

1. Garcia, N. & Damask, A. "Physics for Computer Science Students". Springer-Verlag, 2012
2. Wahab, M.A. "Solid State Physics: Structure and Properties of Materials". Narosa Publishing House, 2009.
3. Gurdeep R.Chatwal, Sham K. Anand, Instrumental methods of chemical analysis, Himalaya Publishing House, 2007.
4. Practical Fiber Optics, D. Bailey and E. Wright, 2003.
5. J.Mendham, RC Denney, JD Barnes, MJK Thomas, Text book of quantitative chemical analysis, Vogel's, 2008.

WEBSITE LINKS

1. https://nptel.ac.in/courses/115/102/115102025/
2. https://www.youtube.com/watch?v=6QUFuZpCgGw
3. http://tiny.cc/0vhjuz
4. 4 .https://nptel.ac.in/content/storage2/courses/103108100/module7/module7.pdf
5. https://nptel.ac.in/courses/108/108/108108122/

CO-PO MAPPING

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

JGE1201	**PYTHON PROGRAMMING** **(Common to all B.E / B.Tech Programmes)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES
- To provide an introduction to Python Programming Language.
- To understand the decision making and looping concepts.
- To understand functions, strings and list in Python.
- To understand tuples, dictionaries and files.
- To know the exception handling and 2D concepts**.**

UNIT I   INTRODUCTION TO PYTHON   9
History of Python, Features, Installing Python, Running Python Program, Interactive mode programming, Script Mode Programming, Identifiers, Reserved Words, Indentation, Comments, Variables, Data Types, Data Type Conversion

UNIT   II   DECISION MAKING AND LOOPING   9
Python Operators, Operator Precedence, Decision Making: if Statement, if else Statement, if elif else Statement, nested if Statement, Loops: while loop, for loop, nested loops; Loop Control Statements: continue Statement, break Statement, pass Statement: Iterator and Generator

UNITIII   FUNCTIONS, STRING, LIST   9
Functions: Pre defined Functions, User defined Functions, Recursion, Lambda Function; String: Functions, methods, modules; Lists: Operations, pre-defined functions, advanced list processing; Packages

UNIT   IV   TUPLES, DICTIONARY, FILES   9
Tuples: Tuple Operations and methods, Dictionary: Dictionary Operations and methods; Files: Text Files, Reading and writing Files; Format Operator, Command line argument

UNIT   V   EXCEPTION HANDLING AND GRAPHICS   9
Date & Time Methods, Exception handling clauses, Raising an Exception, User Defined Exception; Simple graphics and image processing, simple 2D drawing - colors and shapes.

TOTAL : 45 PERIODS

COURSE OUTCOMES:
At the end of the course, the student will be able to
- Understand the evolution of Python and run basic python programs.
- Structure simple python programs for solving programs.
- Decompose larger programs into functions.
- Understand compound structures like list, tuple, and dictionary.
- Learn basic 2D graphics concepts in Python.

TEXTBOOKS:
1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think- python/)
2. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:
1. John V Guttag, ―Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd., 2015.
4. Kenneth A. Lambert - Fundamentals of Python: First Programs‖, CENGAGE Learning, 2012.
5. Charles Dierbach, Introduction to Computer Science using Python: A Computational Problem Solving Focus, Wiley India Edition, 2013.
6. Paul Gries, Jennifer Campbell and Jason Montojo, Practical Programming: An Introduction to Computer Science using Python 3‖, Second edition, Pragmatic Programmers, LLC, 2013.

CO-PO MAPPING

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

JGE1202	ENGINEERING GRAPHICS AND DESIGN (Common to all B.E / B.Tech. Programmes)	L	T	P	C
		1	0	4	3

COURSE OBJECTIVES
- To understand the importance of graphics in engineering
- To develop skills in preparation of basic drawing
- To improve their technical communication skill in the form of communicative drawing
- To impart knowledge about standard principle of orthographic projection of objects.
- To improve their visualization skills for developing new products.

UNIT I   PLANE CURVES AND ORTHOGRAPHIC PROJECTION   15

Conics - Construction of ellipse, Parabola and hyperbola by eccentricity method - Construction of cycloid - construction of involutes of squad and circle - Drawing of tangents and normal to the above curves. Representation of Three Dimensional objects - General principles of orthographic projection - Need for importance of multiple views and their placement - First angle projection - layout views - Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES   15

Projection of points and straight lines located in the first quadrant - Determination of true lengths and true inclinations - Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT III PROJECTION OF SOLIDS   15

Projection of simple solids like prisms, pyramids, cylinders and cones when the axis is inclined to one reference plane by change of position method.

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES   15

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other - Obtaining true shape of section.
Development of lateral surfaces of simple and truncated solids - Prisms, pyramids, cylinders and cones - Development of lateral surfaces of solids with cylindrical cut-outs and square cut-outs, perpendicular to the axis.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS   15

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids and cylinders by visual ray method.

TOTAL: 75 PERIODS

COURSE OUTCOMES:

On successful completion of this course, the student will be able to
- Familiarize with the fundamentals and standards of engineering graphics.
- Perform free hand sketching of basic geometrical constructions and multiple views of objects.
- Project orthographic projections of lines and plane surfaces.
- Draw projection of solids and development of surfaces.
- Interpret isometric and perspective view of objects.

TEXT BOOKS:
1. Natarajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.
2. Venugopal K and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.
3. Bhatt N.D. and Panchal V.M., - Engineering Drawing‖, Charotar Publishing House, 50th Edition, 2010.

REFERENCES:
1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I & II combined), Subhas Stores, Bangalore, 2007.
3. Luzzader, Warren.J and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4. N S Parthasarathy and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
5. Shah M.B and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.

PUBLICATION OF BUREAU OF INDIAN STANDARDS:
1. IS 10711 - 2001: Technical products Documentation - Size and lay out 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.

WEB SITE REFERENCES:
1. www.pdfdrive.com/engineering drawing-books.html
2. https://freevideolectures.com
3. https://nptel.ac.in/courses
4. https://nptel.ac.in/courses/105/104/105104148/
5. https://nptel.ac.in/courses/112/103/112103019/

CO-PO MAPPING

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

JCS1301	DATA STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To be familiar withpointers and structures in C
- To understand the concepts of ADTs
- Touselinear data structures–lists, stacks, and queues
- To apply Tree and Graph structures
- To understand sorting, searching and hashing algorithms

UNIT I   DATA STRUCTURES IN C –LISTS   9

Dynamicmemory allocation using mall oc(), free()-Pointers to Structure-Introduction to Data Structures– Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked listimplementation – Singly linkedlists- Circularly linkedlists– Doubly-linkedlists – Applications oflists–Polynomial Manipulation

**UNIT   II   LINEAR DATA STRUCTURES-STACK AND   9
                      QUEUE**

Stack ADT – Array implementation of stack – Linked List implementation of stack– Applications ofstackADT–Infix to Postfix Notation, Evaluatingarithmeticex pressions– QueueADT–Array implementation of Queue – Linked List implementation of Queue – Circular queue – Applications ofqueues

UNIT   III   NON-LINEAR DATA STRUCTURES- TREES   9

TreeADT–Tree terminologies–BinaryTreeADT-Tree traversals–Expression trees–Binary search treeADT-AVLTrees –Complete binarytree–Fullbinary tree-Heap–Priority queue usingHeap–B-Tree-B+Tree

**UNIT   IV   NON-LINEAR DATA STRUCTURES-   9
                      GRAPHS**

Graphs - Definition – Representation of Graph – Types of graph – Breadth-first traversal– Depth-first traversal – Topological Sort – Applications of graphs-Shortest path algorithm – Dijkstra's algorithm-Minimums panning trees-Prim'sAlgorithm-Kruskal'sAlgorithm

UNIT V   SEARCHING, SORTING AND HASHING TECHNIQUES   9

Searching-LinearSearch–BinarySearch.Sorting–Bubblesort–Selectionsort–Insertionsort

Hashing-Hash Functions –Separate Chaining–Open Addressing–Rehashing

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- Write programs using pointers and structures in C
- Implement abstract data types of linear data structures
- Apply the different linear data structures to problem solutions
- Apply the different non-linear data structures to problem solutions
- Implement the various sorting and hashing algorithms

TEXT BOOKS

1. Mark Allen Weiss,"Data Structures and Algorithm Analysis in C",2nd Edition, Pearson Education,2014.
2. Yashavant Kanetkar, "Understanding Pointers in C&C++", 5th Revised & UpdatedEdition, BPB Publications, 2018.

REFERENCES

- Reema Thareja,"Data Structures Using C", Second Edition, Oxford University Press, 2014.
- E.Balagurusamy, "Data Structures Using C", McGraw Hill Education; First edition 2017.
- Jeri R.Hanly, Elliot B.Koffman, "Problem Solving and Program Design in C", 7th Edition,2012, Prentice-Hall.
- A.KSharma, "Data Structures usingC", Second Edition, Pearson Education India 2013.
- Aaron M.Tenenbaum, Yedidyah Langsam, MosheJ. Augenstein, "Data Structures UsingC", Pearson Education; First edition 2019.
- Aho, Hopcroft and Ullman, "Data Structures andAlgorithms", Pearson Education, 2002.

WEBSITE REFERENCES

- https://nptel.ac.in/courses/106/102/106102064/
- https://www.hackerearth.com/practice/data-structures/arrays/1-d/tutorial/
- https://www.geeksforgeeks.org/data-structures
- https://www.tutorialspoint.com/data_structures_algorithms/index.htm

Mapping of CO with PO/PSO

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

JNC1261	ENVIRONMENTAL SCIENCE (Common to all B.E / B.Tech Programmes)	L	T	P	C
		3	0	0	0

COURSE OBJECTIVES

- To study the interrelationship between living organism and environment.
- To finding and implementing scientific, technological to environmental problems due to pollution.
- To study about various natural resources and the individual responsibility to conserve it.
- To study on the social issues over environment.
- To get knowledge on population explosion, human rights and value education.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 9

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids - Nitrogen Cycle, Oxygen Cycle, Carbon Cycle, Phosphorous Cycle. Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – value of biodiversity- threats to biodiversity– conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

UNIT II ENVIRONMENTAL POLLUTION 9

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – climate change, global warming, acid rain, ozone layer depletion.

UNIT III NATURAL RESOURCES 9

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources- effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. Energy resources: renewable and non renewable energy sources, Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources.

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT 9

Urban problems related to energy – water conservation- rain water harvesting, watershed management – resettlement and rehabilitation of policy. – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 9

Human population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health.

TOTAL: 45 PERIODS

COURSE OUTCOMES
At the end of course completion, students will be able to
- Explain about ecosystem, their structure and function to conserve biodiversity.
- Recognize the level of environmental pollution and their control measures.
- Explain about the various types of natural resources and role of a human being in maintaining a clean sustainable environment for the future generations.
- Identify the social problems in the environment to reduce social issues.
- Understand environment and human health – human rights – value education, and the role of information technology in environment and human health.

TEXT BOOKS:
1. Benny Joseph, Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M. Masters, Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

REFERENCES:
1. Dharmendra S. Sengar, Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
2. Erach Bharucha, ―Textbook of Environmental Studies‖, Universities Press (I) PVT. LTD, Hyderabad, 2015.
3. Rajagopalan, R, Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.
4. G. Tyler Miller and Scott E. Spoolman, ―Environmental Science, CENGAGE Learning India PVT, LTD., Delhi, 2014.

WEB SITE REFERENCES:
1. https://moef.gov.in/e-books/
2. https://www.csindia.org/understanding-eia-383
3. https://nptel.ac.in/courses/120108004
4. https://nptel.ac.in/courses/107/103/107103081/
5. https://nptel.ac.in/courses/109/104/109104045/

CO-PO MAPPING

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

		L	**T**	**P**	**C**
JEC1209	**HERITAGE OF TAMILS**	**2**	**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   3
AND INDIAN CULTURE

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 BOOKS

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

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

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

JGE1211	**PYTHON PROGRAMMING LABORATORY** **(Common to all B.E / B.Tech Programmes)**	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES
- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples and dictionaries.
- To implement basic 2D diagrams.

LIST OF PROGRAMS
1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Guess an integer number in a rang
6. Insert a card in a list of sorted cards.
7. Multiply matrices
8. Programs that take command line arguments (word count)
9. Find the most frequent words in a text read from a file
10. Create an User defined Exception
11. Draw a 2D circle and square

TOTAL: 60 PERIODS

PLATFORM NEEDED
Python 3 interpreter for Windows/Linux

COURSE OUTCOMES:
At the end of the course, the student will be able to
- Write, test, and debug simple Python programs.
- Implement Python programs with conditionals and loops.
- Develop Python programs step-wise by defining functions and calling them.
- Use Python lists, tuples, dictionaries for representing compound data.
- Draw 2D graphic diagrams in Python.

WEBSITE REFERENCES:
1. https://www.programiz.com/python-programming/examples
2. https://www.javatpoint.com/python-condition-and-loops-programs
3. https://realpython.com/python-lists-tuples/
4. https://www.tutorialsteacher.com/python/python-user-defined-function
5. https://www.cdslab.org/python/notes/visualization/2d/2d.html

CO-PO MAPPING

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

		L	T	P	C
JCS1311	**DATA STRUCTURES LABORATORY**	**0**	**0**	**4**	**2**

COURSE OBJECTIVES

- To implement linear and non-linear data structures
- To identify and implement appropriated at a structures for various applications
- To execute different operations of search trees
- To implement various sorting and searching algorithms
- To implement hashing techniques

LIST OF PROGRAMS

Implement the following programs

1. List ADT using Python with insert, delete, search and modify operations
2. Linked list
3. Polynomial Manipulation using list ADT
4. Stack using Python
5. a. Stack ADT using arrays
   b. Stack ADT using linked list
6. a. Queue ADT using arrays
   b. Queue ADT using linked list
7. Infixto Post fix conversion
8. Circular queue
9. Binary Search Trees and Tree traversals
10. AVL Trees
11. BFS and DFS of a graph
12. Bubblesort, Selection sort, Insertion sort using Python
13. Linear search and Binarysearch using Python
14. Hashing-Linear Probing andQuadratic Probing

TOTAL 60 PERIODS

COURSE OUTCOMES

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

1. Identify appropriate data structures for specified problem definition
2. Implement operations like searching, insertion, deletion, traversingmechanism etc. on various data structures
3. Apply appropriate linear /non-linear data structure operations forsolving a given problem
4. Implement appropriate sorting/searching technique for given problem
5. Apply appropriate hash functions that result in a collision free scenario for data storageand retrieval.

TEXT BOOKS

1. Yashavant Kanetkar,"Understanding Pointersin C&C++", 5th Revised& Updated Edition, BPB Publications,2018.
2. Rance D.Necaise, "Data Structures andAlgorithms Using Python",Wiley Publications, 2010.

WEBSITE REFERENCES

1. https://www.geeksforgeeks.org/data-structures/
2. www.nptel.ac.in/courses/106106130/
3. https://www.tutorialspoint.com/python_data_structure/

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTSHARDWARE

Stand alone desktops 30 Nos. (or) Server supporting 30 terminals or more

SOFTWARE

Ubuntu C / Python 3

Mapping of CO with PO

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

JMA1304	DISCRETE MATHEMATICS FOR COMPUTER SCIENCE	L	T	P	C
		2	2	0	3

COURSE OBJECTIVES:
- To equip students with the ability to deal with abstraction by way of propositional logic.
- To familiarize students in combinatorial problems and its applications.
- To develop the ability to apply the concepts of Fuzzy logic.
- To introduce fundamental concepts in number theory and its applications.
- To conceptualize congruence, its applications and standard theorems.

UNIT I LOGIC AND PROOFS   12
Propositional logic – Propositional equivalences - Predicates and quantifiers – Nested quantifiers – Rules of inference - Introduction to proofs – Proof methods and strategy.

UNIT II COMBINATORICS   12
Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications.

UNIT III FUZZY LOGIC   12
Fuzzy sets – Properties and Operations – Fuzzy relations – Operations on Fuzzy relations - Classical logic – Multivalued logic – Fuzzy propositions – Fuzzy quantifiers

UNIT IV DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS12
Division algorithm – Base-b representations – Number patterns – Prime and composite numbers – GCD – Euclidean algorithm – Fundamental theorem of arithmetic – LCM - Linear Diophantine equations.

UNIT V CONGRUENCES AND CLASSICAL THEOREMS   12
Congruences – Linear Congruences - Applications: Divisibility tests - Modular exponentiation - Chinese remainder theorem – 2 x 2 linear systems - Wilson's theorem – Fermat's little theorem – Euler's theorem – Euler's Phi functions – Tau and Sigma functions.

TOTAL: 60 PERIODS

COURSE OUTCOMES:
At the end of the course, students will be able
CO1: To understand propositional logic and various proof methods and strategy.
CO2:To use counting principles and mathematical induction in solving combinatorial problems.
CO3: To understand applications of multivalued logic and fuzzy logic in problems.
CO4:To understand divisibility theory and canonical decompositions of number theory.
CO5:To solve simple problems using classical theorems of number theory.

TEXT BOOKS:
1. Rosen, K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.

2. Tremblay, J.P. and Manohar.R, " Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.
3. George J. Klir and Yuan, B., Fuzzy sets and fuzzy logic, Theory and applications, Prentice Hall of India Pvt. Ltd., 1997.
4. Koshy, T., ―Elementary Number Theory with Applications, Elsevier Publications, New Delhi, 2002.

REFERENCES:
1. Grimaldi, R.P. "Discrete and Combinatorial Mathematics: An AppliedIntroduction", 4th Edition, Pearson Education Asia, Delhi, 2007.
2. Lipschutz, S. and Mark Lipson., "Discrete Mathematics", Schaum'sOutlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.
3. Koshy, T."Discrete Mathematics with Applications", ElsevierPublications, 2006.
4. Lidl, R. and Pitz, G, "Applied Abstract Algebra", Springer Verlag, NewDelhi, 2nd Edition, 2006.
5. Niven, I., Zuckerman.H.S., and Montgomery, H.L., ―An Introduction toTheory of Numbers‖, John Wiley and Sons , Singapore, 2004.
6. San Ling and Chaoping Xing, ― Coding Theory – A first Course,Cambridge Publications, Cambridge, 2004.

WEB REFERENCES:

1. https://nptel.ac.in/courses/111106086/
2. https://nptel.ac.in/courses/111106155/
3. https://nptel.ac.in/courses/127105006/
4. https://nptel.ac.in/courses/111101137/
5. https://nptel.ac.in/courses/111103020/

CO-PO MAPPINGS:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	2	-	-	2
CO2	3	3	2	2	-	-	-	-	2	-	-	2
CO3	3	3	2	2	-	-	-	-	2	-	-	2
CO4	3	3	2	2	-	-	-	-	2	-	-	2
CO5	3	3	2	2	-	-	-	-	2	-	-	2
AVG	3	3	2	2	-	-	-	-	2	-	-	2

JCS1302	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To learn the working of various datamodels and get exposed to SQL querying
- To design data base with ERmodels and understand the significance of normalization
- To understand the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures
- To have an introductory knowledge about the Storage and Query processing Techniques
- To familiarize the students with different types of advanced databases

UNIT I DATA MODELS AND QUERYING   9
Purpose of Data base System–Views of data–Data Models–Data base System Architecture Introduction to relational databases–Relational Model–Keys–Relational Algebra–SQL fundamentals–Advanced SQL features–Embedded SQL–Dynamic SQL.

UNIT II DESIGN AND NORMALIZATION   9
Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping 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 TRANSACTION PROCESSING   9
Transaction Concepts–ACID Properties– Schedules–Serializability–Concurrency Control–Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery - Save Points –Isolation Levels–SQLFacilities for Concurrency and Recovery

UNIT IV IMPLEMENTATION TECHNIQUES   9
RAID – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – QueryProcessing Overview–Query optimization.

UNITV ADVANCED DATABASE SYSTEMS   9
Distributed Databases Architecture – Data Storage – Transaction Processing – Object- basedData bases Object Database Concepts –Object-Relational Features– ODMG Object Model– ODL– OQLXML Databases –XML Hierarchical Model –DTD– XMLSchema–XQuery– DatabaseConnectivity–Fundamentals of Database security.

TOTAL 45 PERIODS

COURSE OUTCOMES
Upon completion of the course, the students will be able to:
- Design efficient databases and extract information with SQL queries
- Develop preliminary design of normalized databases
- Analyze the various stransactions and provide smooth access of data
- Create organized databases and write optimized queries
- Learn the various advanced database concepts and security

TEXTBOOKS

1. Abraham Silberschatz, HenryF. Korth, S.Sudharshan, "Database System Concepts", Seventh Edition, TataMcGraw Hill, 2020.
2. RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Sixth Edition, Pearson Education, 2015.

REFERENCES
1. Raghu Ramakrishnan, "Database Management Systems", Fourth Edition, McGraw-Hill College Publications, 2015.
2. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2008.
3. G.K.Gupta, "Database Management Systems" ,Tata McGrawHill, 2011.

WEBSITE REFERENCES
1. https://www.tutorialspoint.com/dbms/index.htm
2. https://www.studytonight.com/dbms/
3. https://www.w3schools.in/dbms/
4. https://sqlzoo.net/

Mapping of CO with PO/PSO

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

JCW1301	INTRODUCTION TO BUSINESS SYSTEM	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the factors and objectives of business system.
- To impart different types of business organization.
- To analyze functions of business and control process.
- To measure business performance using different indicators
- To understand to run a business efficiently and effectively

UNIT-I   OVERVIEW OF BUSINESS SYSTEM   9

Business environmental factors - Internal and External – Input, Transformational process and output of business process- Objectives - System model of business management, Management functions – Planning, Organising, Staffing, Directing and Controlling.

UNIT-II   BUSINESS ORGANISATION   9

Types of Business organization - Sole proprietorship-partnership-company-public and private sector enterprises-Multinational and Global companies-Managing Global environment- Management levels and types

UNIT-III   FUNCTIONS OF BUSINESS CONTROL PROCESS   9

Functions and Objectives of business system – Production-Marketing-Finance-Human Resource-Quality control and Research & development-Controlling Techniques - Budgetary and Non Budgetary control measures

UNIT-IV   MEASURING BUSINESS PERFORMANCE   9

Key performance indicators-Financial statement analysis- Cash flow analysis, ROI, working capital, cost volume profit analysis. Customer - satisfaction Retention and acquisition. Employee Performance - Benchmarking, employee retention

UNIT-V   COMPUTER APPLICATIONS IN BUSINESS   9

Introduction to business Software-Enterprise application and Business application- Overview On types of Business software- Enterprise Resource Planning (ERP), Business Intelligence, e- business and e-governance

TOTAL: 45 PERIODS

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

- Analyze the need and objectives of business systems.
- Organize different business organization.
- Implement functions of business.
- Integrate business performance in applications
- Work with business applications effectively

TEXT BOOKS
1.   Harold Koontz, Heinz Weihrich, Mark V. Cannice, "Essentials of Management", Tata McGrawHill, 11th Edition, 2020.
2.   Harry L. Davey and London School of Management Studies, "Introduction to Business Systems", Createspace Independent Pub, 2015.

3.   Stephen P. Robbins and David A. Decenzo, "Fundamentals of Management", Pearson Education,8th Edition, 2012.

REFERENCES
1.   Corey Schou and Dan Shoemaker, "Information Assurance for the Enterprise: A Roadmap to Information Security", Tata McGraw Hill, 2007.
2.   James A. O'Brien, "Management Information Systems: Managing Information Technology in the Business Enterprise", Tata McGraw Hill, 2004.
3.   Bateman Snell, "Management: Competing in the new era", McGraw-Hill Irwin, 5th Edition, 2002.

Mapping of CO with PO/PSO

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

JCS1403	DESIGN AD ANALYSIS OF ALGORITHMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To impart knowledge on runtime analysis of algorithms
- To study and understand various algorithm design techniques
- To analyze various searching and sorting algorithms
- To study the various graph algorithms
- To learn the limits of computation

UNIT - I   INTRODUCTION   9

Introduction Fundamentals of Algorithmic Problem Solving- Important Problem types – Fundamental Data structures –Time complexity- Space complexity- Analysis Framework – A symptotic notations- Basic Efficiency classes.

UNIT - II   FUNDAMENTAL SOFTHE ANALYSIS OF   9
ALGORITHME FFICIENCY

Best, Average and Worst Case Analysis-Linear search-Amortized efficiency- Mathematical Analysisof Non- recursive Algorithm - Mathematical Analysis of Recursive Algorithm -Example: Fibonacci Numbers.

UNIT - III   ANALYSIS OF SORTING AND SEARCHING   9
ALGORITHMS

Brute Force Strategy: Selection Sort and Bubble Sort, Brute-force string matching ,Exhaustive search- Knapsack problem, Assignment problem, Travelling Salesman Problem-Divide and conquer: general method-Masters theorem-Mergesort, QuickSort, BinarySearch.

UNIT - IV   ANALYSIS OF GRAPHAL GORITHMS   9

Dynamic Programming: Warshalls and Floyd Algorithm, Optimal Binary Search trees-Greedy Technique: Container Loading Problem, Huffman trees, knapsack problem.

UNIT - V   NP COMPLETE AND NPHARD PROBLEMS   9
NP Complete and NP Hard-NP Complete problems, backtracking: n-Queens Problem, Hamiltonian Circuit problem, Subset-Sum problem- Branch and bound: Assignment problem, Knapsack problem, Traveling sales man problem.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- Gain knowledge on fundamental so falgorithmic problem solving
- Analyze the algorithm efficiency
- Compare different types of sorting and searching algorithms
- Familiarize in different design technique s of Graph Algorithms
- Analyze NP complete, N Phard problems, back tracking and branch & bound techniques

TEXTBOOKS

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education Asia, 2012
2. Horowitz, Sahni, and Rajasekaran, "Computer Algorithms", Silicon Press, 2007.

REFERENCES

1. Sara Baase and Allen Van Gelder, "Computer Algorithms Introduction to Design and Analysis", Pearson Education Asia, 2010
2. T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, "Introduction to Algorithms", PHI Pvt.Ltd. ,2009.
3. V.Aho, J.E.Hopcroft and J.D.Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education Asia, 2003.

WEBSITE REFERENCES

1. https://www.geeksforgeeks.org/algorithms-gq/analysis-of-algorithms-gq
2. https://www.javatpoint.com/daa-tutorial

Mapping of CO with PO/PSO

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

JCS1321	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		2	0	2	3

COURSE OBJECTS

- Tounder stand the basic concepts of Object Oriented Programming in Java
- To know the principles of in heritance and interfaces
- To define exceptions and use of I/O streams
- To learn the concepts of threads and generics classes
- To design and build simple Graphical User Interfaces usings wing components

UNIT-I   INTRODUCTION TOOOP AND JAVA FUNDAMENTALS   **12**

Object Oriented Programming –objects and classes –features of OOP-OOP in Java – CharacteristicsofJava–TheJavaEnvironment-JavaSourceFile–Compilation.Fundamental Programming Structures in Java –constructors, methods – method overloading, access specifies -static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays, Packages, and Naming Conventions, Case study-simple program using objects, classes and constructors.

UNIT-II   INHERITANCE AND INTER FACES   **12**

Inheritance –Super classes-sub classes –Protected members –constructors in sub classes-the Object class –abstract classes and methods-final methods and classes –Interfaces –defining an interface, implementing interface, differences between classes and interfaces and extending interfaces-Object cloning-inner classes, Reflection, Array Lists –Strings, Case study- program using inherit ancestrings and array List.

UNIT - III   EXCEPTION HANDLING AND I/O   **12**

Exceptions -exception hierarchy -throwing and catching exceptions –built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics –Streams –Byte streams and Character streams–Reading and Writing Console–Reading and Writing Files, Case study-program using Exceptions and File Handling

**UNIT- IV   MULTI THREADING, GENERIC PROGRAMMING AND   12
                ADVANCED JAVA**

Differences between multi-threading and multit asking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, **Fibers,** daemonthreads, thread groups. Generic Programming–Generic classes –generic methods –Bounded Types –Restrictions and Limitations, Case study-program using Multi threading and Generic Programming.

UNIT-V   EVENT DRIVEN PROGRAMMING   **12**

Graphics programming -Frame –Components -working with 2D shapes -Using color, fonts, and images -Basics of event handling -event handlers -adapter classes -actions -mouse events - AWTevent hierarchy -Introduction to Swing –layout management -Swing Components –Text Fields, TextAreas –Buttons-Check Boxes –Radio Buttons –Lists-choices-Scrollbars – Windows –Menus–Dialog Boxes, Case study-Program using AWT components and Swing Components.

TOTAL: 60 PERIODS

LIST OF EXPERIMENTS

1. Write a Java Program to capture the personal details of a person.
2. Develop an application with Employee class with Emp_name, Emp_id, Address, Mail_id,Mobilenoas members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.
3. Write a program to perform string operations using Array List.
4. Write a program to do the arithmetic operations with required exceptions.
5. Write a program to read a file and print on the console
6. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print avalue of cube of the number.
7. Write a java program to find the maximum value from the given type of elements using A generic function.
8. Design a login screen using JAVAAWT components.

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

- Develop Java programs using OOP principles
- Develop Java programs using inheritance and interfaces concepts
- Build Java applications using exceptions, I/O streams and Java beans
- Develop Java applications with threads and generic classes
- Develop interactive applications usings wings

TEXTBOOKS
1. Herbert Schildt,"Java The complete reference",11th Edition, McGraw Hill Education, 2017.
2. Cay S. Horstmann, Garycornell,"CoreJavaVolume–I Fundamentals", 9th Edition, Prentice Hall, 2013.

REFERENCES
1. Paul Deitel, HarveyDeitel,"Java SE 8 for programmers", 3rd Edition, Pearson, 2015
2. Steven Holzner,"Java2 Black book", Dream tech press, 2011.

WEB REFERENCES
1. https://www.w3schools.com/java/java_intro.asp
2. https://www.tutorialspoint.com/java/index.html
3. https://www.javatpoint.com/java-tutorial
4. https://developer.ibm.com/tutorials/j-introtojava1/

Mapping of CO with PO/PSO

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

JPT1001	SOFT SKILLS AND APTITUDE - I	L	T	P	C
		0	0	2	*

COURSE OBJECTIVES

- To help students groom their personality and develop their skill of building social relationships
- To improve the personality traits of students and their creativity
- To help students gain knowledge in rational thinking and aptitude
- To make students think logically and judiciously
- To help student acquire technical skills in C Programming language

UNIT-I   SOFTS KILLS AND APTITUDE-I   9

Self-Realization – Self Motivation – Relationship Building – Personality Enrichment – PersonalityTraits–Intra Personal Communication–Inter Personal Communication–Behavioral Based Perception–Attitude & Behavior–SWOT Analysis

UNIT-II   SOFTSKILLSANDAPTITUDE–II   9

Dimensions of Personality – Self Confidence – Open Mindedness – Acceptance – Creativity –Strategies for developing creativity–Over coming mythsofcreativity–Presence of Mind–Staying Focused–Self Acceptance–Self Growth

UNIT-III   QUANTITATIVEAPTITUDE   9

Number system–Divisibility Rule–Simplification– Surds and Indices–Squareroot and Cuberoot – Averages– Percentage

UNIT-IV   LOGICALREASONING   9

Number series–Alphabet series–Alphabet test–Word test–Letter Arrangement– Word Arrangement–Coding and Decoding–Analogy

UNIT-V   TECHNICALAPTITUDE INC-I   9

Technical aptitude in C:Program Structure – Data types – Variables – Constants – Operators –Decision Making-Switch statement–Looping statements–Functions–Call by reference- Recursive Arrays, single dimensional, Multi-dimensional

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- Build better relationship with all in their social settings
- Engage in creative activities focusing on their career
- Solve the real time and complex problems in aptitude
- Solve critical reasoning and real time application problems
- Apply their knowledge in the basics of C programming

TEXTBOOKS

1. Dr.R.S.Aggarwal,"Quantitative Aptitude", S.Chand Publishing, 2020.
2. Dr.R.S.Aggarwal,"A Modern Approach to Verbal Reasoning", S. Chand Publishing, 2017.

3. Dr.R.S.Aggarwal,"A Modern Approach to Non-Verbal Reasoning", S.Chand Publishing, 2017.
4. Pradip Dey, ManasGhosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009.
5. Yashavant P.Kanetkar. "Let Us C", BPB Publications, 2011.

WEB REFERENCES

1. https://www.indiabix.com/aptitude/questions-and-answers/
2. https://m4maths.com/placement-puzzles.php
3. https://www.youtube.com› watch/average
4. https://www.youtube.com›watch/codinganddecoding
5. https://www.youtube.com›watch/cprograms
6. https://www.youtube.com›watch/selfconfidence
7. https://www.youtube.com› watch/motivation

Mapping of CO with PO

CO\PO	PO 1	PO 2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO11	PO 12
CO1	-	2	3	2	-	-	1	3	2	1	-	-
CO2	-	2	3	2	-	-	1	3	2	1	-	-
CO3		2	3	2	-	-	1	3	2	1	-	-
CO4		2	3	2	-	-	1	3	2	1	-	-
CO5		2	3	2	-	-	1	3	2	1	-	-

JCS1312	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES
- To familiarize with DDL, DML and DCL Commands
- To learn the use of nested and join queries
- To understand functions, procedures and procedural extensions of databases
- To be familiar with database triggers for specific application
- To develop applications using front-end tools and back-end DBMS

LIST OF EXPERIMENTS
1. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements
2. Database Querying–Simple queries, Nested queries, Subqueries and Joins
3. Creation of Views, Sequences, Indexes, Save point and commit constraints
4. Database Programming: Implicit and Explicit Cursors with PL/SQL block
5. Creation of PL/SQL Procedures and Functions
6. Creation of PL/SQLTriggers
7. ExceptionHandling
8. Database Designusing ER modeling, Normalization and Implementation for any application
9. Database Connectivity with Front EndTools
10. Mini project (Application Development) in one or two of the following systems
    a. Student database system
    b. Inventory Control System
    c. Online Library Management
    d. Hospital Management System
    e. Railway Reservation System
    f. Personal Information System
    g. Online Course registration and maintenance System
    h. Attendance Management System
    i. Hotel Management System
    j. E-commerce portal
    k. Online auction system

TOTAL: 60 PERIODS

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

- Execute typical data definitions, data control and data manipulation commands
- Familiarize with Nested and Join Queries for extracting combinatorial data
- Implement simple applications that useViews
- Develop PL/SQL procedures, functions and packages
- Develop applications using Front-end & Back-end Too lsand also to handle report generation

TEXTBOOKS
1. Abraham Silberschatz, Henry F.Korth,S.Sudharshan, "Database System Concepts", Seventh Edition, Tata McGrawHill, 2020.
2. Ramez Elmasri, ShamkantB. Navathe, "Fundamentals of Database Systems", Sixth Edition, Pearson Education, 2015.

WEBSITE REFERENCES
1. https://www.w3schools.com/sql/default.asp
2. https://www.tutorialspoint.com/dbms/er_diagram_representation.htm
3. https://www.tutorialspoint.com/python/python_database_access.htm
4. https://sqlzoo.net

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS HARDWARE:
Standal one desktops 30 Nos. (or) Server supporting 30 terminals or more.

SOFTWARE:
Frontend: Python/Visual Studio or Equivalent
Backend: Oracle/MS SQLServer /MySQL/DB2 or Equivalent

Mapping of CO with PO/PSO

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

JCW1311	BUSINESS COMMUNICATION LABORATORY I	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES
- To focus on the development of basic fluency in English.
- To introduce the concept and importance of interpersonal skills.
- To engage in group activities to develop their skills
- To emerge as a professional in an organization.
- To understand the ethics and the usage in workplaces.

LIST OF EXPERIMENTS
1. Business Terminology
2. Interpersonal Skills: Dialogue & Conversation
3. Job Application
4. Reports and Letters
5. SWOT Analysis
6. Team Vs Group
7. Conflict Management
8. Acquiring Leadership Traits
9. Women in all Spheres
10. Human values and Corporate Culture

TOTAL: 60 PERIODS

COURSE OUTCOMES
Upon completion of the course, the students will be able to:
- Speak fluently in English without errors in the sentence construction and hence present themselves as effective English communicators.
- Use business vocabulary and take part comfortably in business conversations in English.
- Drafts letters and reports with appropriate formats and choice of words.
- Perform well in team and group, resolve conflicts in work places and acquire leadership skills.
- Understand women in all spheres and culture behaviors of the people and approach them

LIST OF EQUIPMENTS:
Systems with Rosetta stone and Globarena

TEXT BOOKS
1. Bovee, Thill and Raina, "Business Communication Today" , Pearson Education, 2017.
2. APAART: Speak Well 1 (English Language and Communication)
3. APAART: Speak Well 2 (Soft Skills)
4. Strategic Writing by Charles Marsh

REFERENCES
1. Dr. Saroj Hiremath , "Business Communication", Nirali Prakashan, 2018.
2. Alan Mc'carthy and O'dell, " English Vocabulary in Use, Cambridge University Press, 4th edition, 2017.
3. Charles Marsh, "Strategic Communication", New International Edition, 2013.

Mapping of CO with PO/PSO

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

JMA1405	APPLIED PROBABILITY AND STATISTICS	L	T	P	C
		2	2	0	3

COURSE OBJECTIVES:

- To provide basic concepts of discrete, continuous random variables and standard distributions.
- To introduce two dimensional random variables, correlation and regression.
- To acquaint students with statistical testing of hypothesis and its applications.
- To develop the ability to apply the concepts of Estimation Theory and Correlation & Regression in problems.

UNIT I   ONE – DIMENSIONAL RANDOM VARIABLES   12

Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Uniform, Exponential and Normal distributions – Function of a random variable.

UNIT II TWO - DIMENSIONAL RANDOM VARIABLES   12

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Regression – Function of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III TESTING OF HYPOTHESIS   12

Statistical hypothesis – Large sample tests based on Normal distribution for single mean, difference of means and proportions – Small sampletests based on t, Chi-square and F distributions for mean and variance – Goodness of fit – Independence of attributes.

UNIT IV   ESTIMATION THEORY   12

Estimators: Unbiasedness, Consistency, Efficiency and Sufficiency – Maximum Likelihood Estimation – Method of moments – Curve fitting by principle of least squares.

UNIT V CORRELATION AND REGRESSION   12

Multiple and Partial Correlation – Method of Least Squares – Plane of Regression – Properties of Residuals – Coefficient of multiple correlation – Coefficient of partial correlation – Multiple correlation with total and partial correlations – Regression and Partial correlations in terms of lower order coefficient

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, students will be able

CO1: To understand random variables and use standard distributionsin solving real time problems.

CO2: To use joint density functions to perform correlation andregression analysis.

CO3: To apply hypothesis testing for making statistical inferences inlarge and small sample real life problems.

CO4: To use theory of estimation in practical applications and problemsolving.

CO5: To understand methods of finding correlation values betweenvariables and use regression analysis for predicting values of variables

TEXT BOOKS:
1. Ibe, O.C.,"Fundamentals of Applied Probability and Random Processes",1st Indian Reprint, Elsevier, 2007.
2. Gupta.S.C., and Kapoor, V.K., "Fundamentals of Mathematical Statistics",Sultan Chand and Sons, Eleventh Edition, 2002
3. R.A.Johnson and C.B.Gupta, "Miller & Freund's Probability and Statisticsfor Engineers", Pearson Education, Asia, 7th Edition, 2007

REFERENCES:
1.Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, NewDelhi, 2004.
2.Trivedi, K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", 2nd Edition, John Wiley and Sons, 2002.
3.Yates, R.D. and Goodman. D. J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2012.
4.Devore. J.L., "Probability and Statistics for Engineering and the Sciences, Cengage Learning, New Delhi, 8th Edition, 2014.
5.Spiegel. M.R., Schiller. J. and Srinivasan, R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw HillEdition, 2004.

WEB REFERENCES:

1. https://nptel.ac.in/courses/111104032/
2. https://nptel.ac.in/courses/103106120/
3. https://nptel.ac.in/courses/117103067/
4. https://nptel.ac.in/courses/108106179/
5. https://nptel.ac.in/courses/111104098/

CO-PO MAPPINGS:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	2	-	-	2
CO2	3	3	2	2	-	-	-	-	2	-	-	2
CO3	3	3	2	2	-	-	-	-	2	-	-	2
CO4	3	3	2	2	-	-	-	-	2	-	-	2
CO5	3	3	2	2	-	-	-	-	2	-	-	2
AVG	3	3	2	2	-	-	-	-	2	-	-	2

JCW1401	IP MANAGEMENT AND ENTREPRENEURSHIP	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To Appreciate innovation as core business process, and ability to apply it to the growth of an organization.
- To Recognize the role of entrepreneurship in giving the organization a sustainable competitive advantage.
- To CreateAwareness of the concept and types of Intellectual Property Rights and their protection.
- To measure business performance using different indicators.
- Learn to investigate, understand and internalize the process of founding a startup.

UNIT-I INNOVATION BASICS 9
Innovation, invention and creativity, Types of innovation, Innovation as a core business process, Sources of innovation, Knowledge push vs. need pull innovations.

UNIT-II BUILDING AN INNOVATIVE ORGANISATION 9
Types of Creating new products and services-Exploiting open innovation and collaboration-Use of innovation for starting a new venture-Explore and manage the effects of new technology on people and work systems

UNIT-III ENTERPRENEURSHIP: GUIDE TO STARTUP 9
Entrepreneurship – character, quality of entrepreneur, Opportunity – risk – establishment strategies – Entrepreneurship is born or made – Techno entrepreneur – registration process and prosperous in global economy - Competitive Advantage.

UNIT-IV FINANCIAL PLANNING & ESSENTIALS OF IPR 9
Financial Projections and Valuation-Stages of financing - Debt, Venture Capital and other forms of Financing-Introduction and the economics behind development of IPR: Business Perspective - IPR in India – Genesis and Development - International Context - Concept of IP Management, Use in marketing.

UNIT-V TYPES OF INTELLECTUAL PROPERTY 9
Patent- Procedure, Licensing and Assignment, Infringement and Penalty- Trademark- Use in marketing, example of trademarks- Domain Name-Geographical Indications- Basics of GI, Purpose of protecting them.

TOTAL: 45 PERIODS

COURSE OUTCOMES
Upon completion of the course, the students will be able to:
- Apply the conceptual knowledge of innovation.
- Analyse the importance of IP.
- Analyse the training models and the management practices.
- Learn the techniques of entrepreneurship.
- Implement, evaluate and control the process of entrepreneurship.
- Gain Knowledge in the field of entrepreneurship and update with recent trends.

TEXT BOOKS
1. Joe Tidd, John Bessant. "Managing Innovation: Integrating Technological,Market and Organizational Change", Wiley India edition, 2020.
2. Business Transformations in the Era of Digitalization (2019), Aloulou, W, IGI Global.

3. Innovative science teaching (2019), Mohan, R. (2019). PHI Learning Pvt. Ltd.

4. Raj Shankar, "Entrepreneurship – Theory and Practice" Vijay Nicole Publications, 2014.

REFERENCES

1. Creative marginality: Innovation at the intersections of social sciences (2019), Dogan, M Routledge.

2. International intellectual property in an integrated world economy (2019), Abbott, F. M., Cottier, T.,& Gurry, F. (2019), Aspen Publishers.

3. Rajeev Roy, "Entrepreneurship" Second Edition, Oxford University Press, 2008.

WEBSITE REFERENCES

1. https://onlinecourses.nptel.ac.in/noc21_hs102/preview

2. https://onlinecourses.nptel.ac.in/noc21_mg70/preview

3. https://onlinecourses.nptel.ac.in/noc21_mg63/preview

4. https://onlinecourses.swayam2.ac.in/ntr21_ed41/preview

5. https://www.udemy.com/course/the21principles

Mapping of CO with PO/PSO

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

JCS1401	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES
- To learn the basic concepts of layered approach in Computer Networks
- To know functions of Data link layer and components to build different types of networks
- To learn the functions of network layer and the various routing protocols
- To familiarize the functions and protocols of the Transport layer
- To familiarize the application layer services

UNIT-I   INTRODUCTIONANDPHYSICALLAYER   9

Building a network - Requirements Layering and protocols - Design issues for the layers- TCP/IP Protocol suite-OSIModel -Physicallayer-MultiplexingandSpreadSpectrum-   EncodingTechniques- Transmission Media-Performance.

UNIT-II   DATA-LINKLAYER&MEDIAACCESS   9

Link layer Services - Framing - Error Detection - Flow control - Media access control - Ethernet(802.3) - Wireless LANs - 802.11 - Bluetooth - Switching and bridging - Basic Internetworking (IP,CIDR,ARP,DHCP,ICMP).

UNIT-III   NETWORKLAYER   9

Network layer - Routing - Shortest Path Routing - Flooding - Routing (RIP, OSPF, metrics) - Switch basics - Global Internet (Areas, BGP, Ipv6) - Multicast - Addresses - Multicast routing(DVMRP,PIM).

UNIT-IV   TRANSPORTLAYER   9

OverviewofTransportlayer-UDP-Reliablebytestream(TCP)-Connectionmanagement-Flowcontrol- Retransmission-TCPCongestioncontrol-Congestionavoidance(DECbit,RED)-QoS.

UNIT-V   APPLICATIONLAYER   9

ElectronicMail(SMTP,POP3,IMAP,MIME)-HTTP-WebServices-DNS -SNMP.

TOTAL:45PERIODS

COURSEOUTCOMES

Upon completion of the course,students will be able to
- Evaluate the functions and performance of a net work
- Comprehend the data flowand control between nodes in the network
- Analyze and design routing algorithms
- Familiarize with the functionalities of various protocols and congestion mechanism in network
- Familiarize with different application layer protocols

TEXTBOOKS
1. BehrouzA. Forouzan,"DataCommunicationsandNetworking", FifthEditionTMH,2017.
2. LarryL. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition,Morgan KauffmannPublishersInc.,2012.

REFERENCES

1. JamesF.Kurose,Keith W.Ross,"Computer Networking:ATop- Down Approach", Seventh Edition, Pearson Education,2017.

2. William Stallings, Data and Computer Communications,TenthEdition,PearsonEducation,2013.

3. NaderF. Mir, Computer and Communication Networks,Second Edition, PrenticeHall,2014.

4. Ying-DarLin,Ren- Hung Hwangand FredBaker,Computer Networks:An Open Source Approach, McGraw Hill Publisher, 2011.

5. Andrew S.Tanenbaum, David Wetherall,"Computer Networks",Fifth Edition,Pearson Education,2013.

WEBSITEREFERENCES

1. https://www.educba.com/routing-algorithms/
2. https://www.cse.iitk.ac.in/users/dheeraj/cs425/lec12.html
3. https://www.engineersgarage.com/tutorials/transport-layer-protocols-iot-part-9/
4. https://www.geeksforgeeks.org/computer-network-tutorials/
5. https://www.tutorialspoint.com/Reference-Models-in-Computer-Network

Mapping of CO with PO/PSO

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

JCS1404	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To study the different software process models and developments
- To learn the fundamental concepts of requirements engineering and Analysis Modeling
- To analyze and apply the various software design methodologies
- To acquire knowledge in various testing methodologies and tools
- To attain the knowledge in Project Management process

UNIT-I   SOFTWAREPROCESSANDAGILEDEVELOPMENT   9

Introduction to Software Engineering – The Software Process –Perspective and Specialized Models–Agile Development–Introduction to Agility-Agile Process-Extreme programming-XP Values– XP Process.

UNIT-II   REQUIREMENTSANALYSISANDSPECIFICATION   9

Software Requirement – Functional and Non-Functional –User requirements –System requirements Software Requirements Document–Requirement Engineering Process–Feasibility Studies Requirements elicitation and Analysis–Requirement Negotiation–Requirements Validation Requirements Management-Classical analysis – Structured system Analysis–Data Dictionary.

UNIT-III   SOFTWAREDESIGN   9

Designprocess–DesignConcepts–DesignModel–DesignHeuristic–ArchitecturalDesign ArchitecturalStyles–ArchitecturalMappingusingDataFlow-UserInterfaceDesign–Interface analysis – Interface Design –Component level Design – Designing Class based components, traditional Components.

UNIT-IV   TESTING AND MAINTENANCE   9

Software Testing Fundamentals -White box Testing – Basis Path Testing-Control Structure Testing Black Box Testing – Regression Testing – Unit Testing – Integration Testing – Validation Testing System Testing – Testing tools– Reengineering Process Model-Reverse and Forward Engineering.

UNIT-V   PROJECT MANAGEMENT   9

Software Project Management – Estimation – LOC – FP Based Estimation – Make/Buy Decision COCOMO I & II Model – Project Scheduling – Earned Value Analysis Planning – Project PlanPlanning Process– RFP Risk Management–Identification–Projection–Risk Mitigation-RMMM Plan- CASE Tools

TOTAL:45 PERIODS

COURSE OUTCOMES

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

- Identify the key activities in managing a software project and compare different process models
- Apply concepts of Requirements Engineering and Analysis Modeling
- Apply systematic procedures in software design and systems
- Compare the various testing strategies
- Handle project management system and qualities

TEXT BOOKS

1. RogerS.Pressman,"Software Engineering –APractitioner's Approach ",Eighth Edition, McGraw-Hill International Edition, 2014.
2. Ian Sommerville, "Software Engineering", 9th Edition, Pearson Education Asia, 2011.

REFERENCES

1. RajibMall,FundamentalsofSoftwareEngineering,ThirdEdition,PHILearningPrivate Limited, 2009.
2. PankajJalote,SoftwareEngineering,APreciseApproach,WileyIndia,2010.
3. Kelkar S.A., "Software Engineering", Prentice Hall of India Pvt Ltd, 2007.
4. StephenR.Schach,"SoftwareEngineering",TataMcGraw-HillPublishingCompanyLimited, 2007.

Mapping of CO with PO/PSO

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

JCS1402	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To study the basic concepts, structure and functions of operating systems
- To learn process management concepts such as process scheduling, CPU scheduling, semaphores and deadlocks etc.
- To learn various memory management concepts
- To understand the file storage handling management and I/O systems
- To learn the case study of operating system and services

UNIT-I   OPERATINGSYSTEMSOVERVIEW   9

Computer System Overview- Basic Elements – Interrupts - Memory Hierarchy - Cache Memory - Direct Memory Access - Operating System Overview - Objectives and Functions - Evolution of Operating System - Operating System Structure and Operations-System Calls-System Programs-OS Generation and System Boot.

UNIT-II   PROCESS MANAGEMENT   9

Processes-Process Concept-Process Scheduling- Operations on Processes –Inter process Communication - CPU Scheduling - Multiple-processor Scheduling-Real Time Scheduling-Threads- Overview- Multithreading Models-Threading Issues-Process Synchronization–Critical Section Problem- Mutex Locks- Semaphores-Monitors-Deadlocks-System Model-Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection - Recovery from Deadlock.

UNIT-III   MEMORYMANAGEMENT   9

Main Memory – Background – Swapping - Contiguous MemoryAllocation–Paging–Segmentation- Segmentation with Paging, 32 and 64 Bit Architecture Examples - Virtual Memory – Background - Demand Paging - Page Replacement – Allocation – Thrashing - Allocating Kernel Memory.

UNIT-IV   FILESYSTEM AND I/O SYSTEM   9

Mass Storage system – Overview of Mass Storage Structure - Disk Structure - Disk Scheduling and Management, Swap Space Management - File-System Interface – File concept - Access methods - Directory Structure - FileSharingandProtection-FileAllocationMethods-FreeSpaceManagement- Efficiency and Performance – Recovery - I/O Systems – I/O Hardware - Application I/O Interface - Kernel I/O subsystem – Streams – Performance.

UNIT-V   CASE STUDY   9

Linux System - Design Principles - Kernel Modules - Process Management – Scheduling Memory Management- Input-OutputManagement -File System -Inter-process Communication - Mobile OS –iOS and Android – Architecture and SDK Frame work-MediaLayer-ServicesLayer-CoreOS Layer - File System.

TOTAL:45 PERIODS

COURSE OUTCOMES

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

- Classify operating system components and system calls based on functionality
- Analyze and evaluate CPU scheduling algorithms and assess the solutions for synchronization problems and deadlock prevention
- Familiarize in memory management and storage management techniques
- Analyze the File System Interface, Directory Structure and I/O systems
- Carryout case studies to generate and illustrate different aspects of various operating systems

TEXT BOOKS

1. Abraham Silberschatz,Peter Baer Galvin and GregGagne," Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2018.
2. William Stallings,"OperatingSystems–InternalsandDesignPrinciples",7thEdition, Prentice Hall, 2018.

REFERENCES

1. Andrew S.Tanenbaum,"ModernOperatingSystems",SecondEdition,AddisonWesley, 2014.
2. Charles Crowley,"OperatingSystems:ADesign-OrientedApproach",TataMcGraw Hill Education", 2018.
3. DM Dhamdhere,"OperatingSystems:AConcept-Based Approach", Second Edition ,Tata McGraw Hill Education.

WEBSITE REFERENCE

1. https://www.tutorialspoint.com/operating_system/os_overview.htm/
2. https://www.geeksforgeeks.org/introduction-of-process-management/
3. https://technobyte.org/memory-management-os-simple-explanation/
4. https://inst.eecs.berkeley.edu/~eecsba1/sp97/reports/eecsba1a/index-os.html

Mapping of CO with PO/PSO

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

JPT1001	SOFT SKILLS AND APTITUDE – II	L	T	P	C
		0	0	2	1

OBJECTIVES

- To help students learn various forms of writing and develop content
- To help students acquire time and stress management skills
- To facilitate students to gain required knowledge to understand practical concepts in aptitude
- To develop the thinking and analytical skills of students
- To gain knowledge in concepts of C programming language

UNIT-I   SOFT SKILLS AND APTITUDE-III   9

Communication – on Specific topics – both oral and written – Content development – various forms of writing and specific writing–Brainstorming–Individual–Concept focusing–Public Speaking–Analytical writing.

UNIT-II   SOFT SKILLS AND APTITUDE-IV   9

ImportanceofTime–TimeManagementtechniques–Theartofprioritizingandscheduling–Stress – Positive and Negative Stress - Stress Management techniques – Concept of Goal setting –Importance of Goals – Dream vs Goal – Reasons for failure of Goals – SMART.

UNIT-III   QUANTITATIVEAPTITUDE   9

Ratio and Proportions – Allegations and Mixtures – Problem on Ages – Profit and Loss and Discount

UNIT-IV   LOGICAL REASONING   9

Odd man out series – Blood Relation – Seating Arrangement – Number Ranking

UNIT-V   TECHNICAL APTITUDE IN C-II   9

Strings - Storage Classes – Pointers – Preprocessor directives - Structures – Union. Type def – Input/Output – File I/O –Header Files–Typecasting–Error handling–Command Line Arguments–Variable Arguments – Memory Management - Bitwise operators.

                                                                    TOTAL:45PERIODS

COURSE OUTCOMES

Upon completion of the course, students will be able to:
- Develop different types of content using the skills learnt
- Manage time and stress competently
- Find answers to real time application problems
- Use logical reasoning skills to solve problems differently
- Apply C programming concepts for coding

TEXTBOOKS

1. Dr.R.S.Aggarwal,"Quantitative Aptitude",S.Chand Publishing,2020.
2. Dr.R.S.Aggarwal,"AModernApproachtoVerbalReasoning",S.ChandPublishing,2017.
3. Dr.R.S.Aggarwal,"AModernApproachtoNon-VerbalReasoning",S.ChandPublishing,2017.
4. PradipDey,ManasGhosh,"FundamentalsofComputingandProgramminginC",First Edition, Oxford University Press, 2009.
5. YashavantP.Kanetkar."LetUsC",BPBPublications,2011.

WEBSITE REFERENCES

- https://www.indiabix.com/aptitude/questions-and-answers/
- https://m4maths.com/placement-puzzles.php
- www.freshersworld.com/
- https://www.youtube.com›watch>problemson ages
- https://www.youtube.com›watch>bloodrelation
- https://www.youtube.com›watch>content
- https://www.youtube.com›watch>SMART
- https://www.youtube.com›watch>stringsinC

MAPPING OF CO WITHPO/PSO

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

JCS1412	OPERATING SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES
- To learn Unix commands and shell programming
- To execute various CPU Scheduling Algorithms
- To implement and familiarize in Process Creation and Inter Process Communication
- To implement Deadlock Avoidance and Deadlock Detection Algorithms
- To implement Page Replacement Algorithms, File Organization and File Allocation Strategies

LIST OF EXPERIMENTS

1. Basics of UNIX commands
2. Write programs using the following system calls of UNIX operatings Systemfork,exec, getpid, exit, wait, close, stat, opendir, readdir
3. Write C programs to simulateUNIXcommandslikecp,ls,grep, etc.
4. Shell Programming
5. Write C programs to implement the various CPU Scheduling Algorithms
6. Implementation of Semaphores
7. Implementation of Shared memory and IPC
8. Bankers Algorithm for Deadlock Avoidance
9. Implementation of Deadlock Detection Algorithm
10. Write C program to implement Threading&Synchronization Applications
11. Implementation of the following Memory Allocation Methods for fixed partition
    a) First Fit   b)WorstFit   c) Best Fit
12. ImplementationofPagingTechniqueofMemory Management
13. Implementation of the following Page Replacement Algorithms
    a) FIFO   b) LRU   c) LFU
14. ImplementationofthevariousFileOrganization Techniques
15. Implementation of the following File Allocation Strategies
    a) Sequential b) Indexed   c) Linked
16. Install, upgrade and configure Linux operating systems.

TOTAL:60 PERIODS

COURSE OUTCOMES
Upon completion of the course, students will be able to:
- Compare the performance of various CPU Scheduling Algorithms
- Implement Deadlock avoidance , Detection Algorithms and Semaphores
- Create processes and implement IPC
- Analyze the performance of the various Page Replacement Algorithms
- Implement File Organization and File Allocation Strategies

TEXT BOOKS

1. Abraham Silberschatz, PeterBaer Galvinand Greg Gagne ," Operating System Concepts ", 9th Edition, John Wiley and Sons Inc., 2018.

REFERENCES

1. WilliamStallings,"OperatingSystems–InternalsandDesignPrinciples",7thEdition,Prentic Hall, 2018.
2. Andrew S.Tanenbaum," ModernOperatingSystems",Second Edition,AddisonWesley,2014.
3. CharlesCrowley,"OperatingSystems:ADesign-OrientedApproach",TataMcGraw Hill Education", 2018.
4. DMDhamdhere,"OperatingSystems:AConcept-BasedApproach",SecondEdition,Tata McGraw Hill Education.

WEBSITE REFERENCE

1. https://www.tutorialspoint.com/operating_system/os_overview.htm
2. https://www.geeksforgeeks.org/introduction-of-process-management
3. https://technobyte.org/memory-management-os-simple-explanation
4. https://www.cse.iitb.ac.in/~mythili/teaching/cs347_autumn2016/notes/09-filesystem-io.pdf
5. https://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/13_IOSystems.html
6. https://inst.eecs.berkeley.edu/~eecsba1/sp97/reports/eecsba1a/index-os.html

MAPPING OF CO WITHPO/PSO

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

JCS1411	NETWORKS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To learn Socket programming
- To study various networking commands
- To implement and analyze various network protocols
- To learn and implement various socket programming concepts
- To simulate and analyze the performance of various network protocols

LISTOFEXPERIMENTS

1. Learn to use commands like tcp dump, netstat, if config, ns look up and trace route. Captureping and trace route PDUs using a network protocol analyzer and examine
2. Write a code simulating ARP/RAR Pprotocols.
3. Write a socket program for HTTP webpage upload and download.
4. Applications usingTCP Sockets like
   a. Echoclient andecho server
   b. Chat
   c. FileTransfer
5. Applications of DNS usingUDPSockets
6. Study of Network simulator and Simulation of Congestion Control Algorithms
7. Study of TCP/UDP performance using Simulation tool.
8. Simulation of DistanceVector/Li nkState Routing algorithm.
9. Performance evaluation of Routing protocols using Simulation tool.
10. Simulation of error correction code(like CRC).

TOTAL:60 PERIODS

COURSE OUTCOMES

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

- Implement various protocols using TCP and UDP
- Implement various network commands
- Simulate the performance of various network protocols
- Implement error correction codes
- Analyze the various routing algorithms

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE
1. Stand alone desktops   **30 Nos**

SOFTWARE

1. C/ C++/Java/Python/Equivalent Compiler   **30 Nos**
2. Network simulator like NS2/Glomosim/OPNET/PacketTracer/Equivalent

WEBSITE REFERENCES

1. https://www.javatpoint.com/socket-programming
2. https://www.tutorialspoint.com/java/java_networking.htm
3. https://www.nstools.org/techprog.shtml
4. https://ipwithease.com/top-5-network-simulation-tools-in-2020/

MAPPING OF CO WITH PO/ PSO

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CO-1	3	3	3	-	-	-	-	3	2	3	-	3	3	3	3
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CO-3	3	3	3	-	-	-	-	2	2	3	-	3	3	3	3
CO-4	2	2	3	-	-	-	-	3	3	3	-	2	3	3	3
CO-5	3	3	3	-	-	-	-	3	2	2	-	3	3	3	3

OPEN ELECTIVE-I

SEMESTER-IV

JCS9002	BASICS OF OBJECT ORIENTED PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:
- To Understand the basic concepts of Object Oriented Programming.
- Execute the Object oriented concepts to solve problems using C++.
- Develop programs using files and templates

UNIT-I   CLASSES AND OBJECTS   9

Need   forobjectorientedprogramming-Characteristicsofobjectorientedprogramming-Classesand Objects: Simple Class-Nesting of Member functions-Static Data Members and Member Functions-Constructors and Destructors - Returning Objects from Functions.

UNIT-II   ARRAYS, STRINGS AND OVERLOADING   9

Array Fundamentals - Arrays as Class Member Data - Arrays of Objects - String Manipulations - Operator overloading: Unary Operators - Binary Operators – Special Operators-Pitfalls of Operator Overloading and Data Conversion.

UNIT-III   INHERITANCE   9

Derived Class and Base Class – Derived Class Constructors-Overriding Member Functions-Public and Private Inheritance - Types of Inheritance: Single, Multi Level, Multiple, Hierarchical and Hybrid - Virtual Base Classes - Abstract Classes

UNIT-IV   FUNCTIONS AND STREAMS   9

Pointers - this Pointer - Pointers to Objects and Derived Classes - Function Overloading - Virtual Function - Friend Function - Static Function. Streams: Stream Classes - Unformatted I/O Operations - Formatted Console I/O Operations.

UNIT-V   FILES, TEMPLATES AND EXCEPTION HANDLING   9

File Stream Operations - File Pointers Manipulation-Templates: Class Templates - Function Templates - Exception Handling Mechanism: Try Throw and Catch.

OUTCOMES:
On Completion of the course, the students should be able to:
- Design problem solutions using Object Oriented Techniques..
- Apply the concepts of data abstraction, encapsulation and inheritance for problem solutions.
- Use the control structures of C++ appropriately
- Critically analyse the various algorithms.
- Apply the different data structures to problem solutions

TEXT BOOK:
1. Bjarne Stroustrup,―The C++ Programming Language‖,4thEdition,Addison-Wesley Professional, 2013.

2. Robert Lafore,-Object oriented programming in C++, 4th Edition, Pearson Education India

REFERENCES
1. Stephen Prata,-C++PrimerPlus,6thEdition,PearsonEducation,2015
2. E Balagurusamy ,-Object oriented programming in C++,6thEdition,McgrawHill publishing

MAPPING OF CO WITH PO

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CO-4	3	1	3	2	3	-	-	-	2	-	-	3
CO-5	3	2	3	2	3	-	-	-	2	-	-	3

JCS9003	USER INTERFACE DESIGN	L	T	P	C

OBJECTIVES

- To learn and understand the Characteristics and principles of Graphical Interface
- To know the design of Graphical Interface
- To learn and understand the design of windows and controls
- To learn the design of web pages and multimedia.
- To have an understanding of the techniques and tools for testing the graphical interface

UNIT-I   INTRODUCTION   8

Human–Computer Interface – Characteristics of Graphics Interface –Direct Manipulation Graphical System – Web User Interface –Popularity –Characteristic & Principles – Usability heuristics.

UNIT-II   HUMAN COMPUTER INTERACTION   10

User Interface Design Process – Obstacles –Usability –Human Characteristics In Design – Human Interaction Speed –Business Functions –Requirement Analysis – Direct – Indirect Methods – Basic Business Functions – Design Standards – System Timings – Human Consideration In Screen Design – Structures Of Menus – Functions Of Menus– Contents Of Menu– Formatting – Phrasing The Menu – Selecting Menu Choice– Navigating Menus– Graphical Menus.

UNIT-III   WINDOWS   9

Characteristics– Components– Presentation Styles– Types– Managements– Organizations– Operations– Web Systems– Device– Based Controls Characteristics– Screen – Based Controls – Operate Control – Text Boxes– Selection Control– Combination Control– Custom Control– Presentation Control.

UNIT-IV   MULTIMEDIA   9

TextForWebPages–EffectiveFeedback–Guidance&Assistance–Internationalization–Accessibility– Icons– Image– Multimedia – Coloring.

UNIT-V   WINDOWSLAYOUT–TEST   9

Prototypes–KindsofTests–Retest–InformationSearch–Visualization–Hypermedia–WWW– Software Tools.

TOTAL:45PERIODS

OUTCOMES:

On Completion of the course, the students should be able to:

- Define the characteristics and principles of different graphical user interface.
- Apply the concepts and principles of designing graphical interface
- Use various controls and styles in designing a window
- Describe the design of multimedia and web pages
- Test and compare various graphical interfaces

TEXT BOOKS:

1. Wilbent.O.Galitz,"TheEssentialGuideToUserInterfaceDesign",JohnWiley& Sons, 2001.
2. Ben Sheiderman, "Design the User Interface", Pearson Education, 1998.

REFERENCE:

1. AlanCooper,"TheEssentialofUserInterfaceDesign",Wiley–DreamTechLtd., 2002.

MAPPING OF CO WITH PO

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CO-3	2	2	3	-	3	-	-	-	-	-	-	-
CO-4	2	2	3	-	3	2	-	-	-	-	-	-
CO-5	2	2	3	-	3	2	-	-	-	-	-	-

JCS1011	BUSINESS INTELLIGENCE	L	T	P	C
		3	0	0	3

COURSEOBJECTIVES:
- Be exposed with the basic rudiments of business intelligence system
- Understand the modeling aspects behind Business Intelligence
- Understand of the business intelligence life cycle and the techniques used init
- Be exposed with different data analysis tools and techniques
- Be exposed to areas of interest of Business Intelligence

UNIT I BUSINESS INTELLIGENCE   9

Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis–Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.

UNIT II KNOWLEDGEDELIVERY   9

The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message.

UNIT III EFFICIENCY   9

Efficiency measures – The CCR model: Definition of target objectives – Peer groups –Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs Other models. Pattern matching – cluster analysis, outlier analysis

UNIT IV BUSINESSINTELLIGENCEAPPLICATIONS   9

Marketing models – Logistic and Production models – Case studies.

UNIT V FUTUREOFBUSINESSINTELLIGENCE   9

Future of business intelligence – Emerging Technologies, Machine Learning, Predicting the Future, BI Search & Text Analytics – Advanced Visualization – Rich Report, Future beyond Technology- Mobile Business intelligence

TOTAL:45 PERIODS

COURSE OUTCOMES:
At the end of the course the students will be able to
- Explain the fundamentals of business intelligence.
- Link data mining with business intelligence.
- Apply various modeling techniques.
- Explain the data analysis and knowledge delivery stages.
- Apply business intelligence methods to various situations.
- Decide on appropriate technique.

TEXTBOOK:

1. EfraimTurban,RameshSharda,DursunDelen,"DecisionSupportandBusiness Intelligence Systems", 9th Edition, Pearson 2013.

REFERENCES:

1. LarissaT.Moss,S.Atre,"BusinessIntelligenceRoadmap:TheCompleteProjectLifecycleof Decision Making", Addison Wesley,2003.
2. CarloVercellis,"BusinessIntelligence:DataMiningandOptimizationforDecisionMaking", Wiley Publications, 2009.
3. DavidLoshinMorgan,Kaufman,"BusinessIntelligence:TheSavvyManager"sGuide", Second Edition, 2012.
4. Cindi Howson, "Successful Business Intelligence: Secrets to Making BI a Killer App", McGraw-Hill,2007.
5. RalphKimball,MargyRoss,WarrenThornthwaite,JoyMundy,BobBecker,"TheData Warehouse Life cycle Toolkit", Wiley Publication Inc., 2007.

MAPPING OF CO WITH PO

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CO-3	3	3	3	2	3	2	1	3	2	1	3	2
CO-4	3	3	2	2	3	3	1	3	2	2	3	1
CO-5	3	3	3	2	3	2	1	3	2	2	3	2