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 INFORMATION TECHNOLOGY

B.TECH. ARTIFICIAL INTELLIGENCE & DATA SCIENCE

CURRICULUM

REGULATION 2021
CHOICE BASED CREDIT SYSTEM

SEMESTER- I

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- II

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	ES	3	3	0	0	3
6.	JGE1202	Engineering Graphics and Design	ES	5	1	0	4	3
7.	JNC1261	Environmental Science	NCM	3	3	0	0	0
8.	JGE1209	Heritage Of Tamils	HS	1	1	0	0	1
PRACTICALS								
9.	JGE1211	Python Programming Laboratory	ES	4	0	0	4	2
10.	JCS1311	Data Structures Laboratory	ES	4	0	0	4	2
TOTAL				**35**	**17**	**2**	**16**	**23**

SEMESTER-III

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	JGE1309	Tamils and Technology	HS	1	1	0	0	1
2.	JMA1304	Discrete Mathematics for Computer Science	BS	4	2	2	0	3
3.	JCS1302	Database Management Systems	PC	3	3	0	0	3
4.	JAD1301	Foundation of Data Science	PC	3	3	0	0	3
5.	JCS1321	Object Oriented Programming	PC	4	2	0	2	3
6.	JCS1404	Software Engineering	PC	3	3	0	0	3
PRACTICALS								
7.	JPT1001	Soft Skills and Aptitude I	HS	2	0	0	2	*
8.	JCS1312	Database Management Systems Laboratory	PC	4	0	0	4	2
9.	JAD1311	Data Science Laboratory	PC	4	0	0	4	2
TOTAL				**28**	**14**	**2**	**12**	**20**

SEMESTER-IV

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.	JIT1602	Artificial Intelligence	PC	3	3	0	0	3
3.	JIT1016	Data Analysis and Visualization	PC	3	3	0	0	3
4.	JCB1401	Data Communication and Networks	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.	JIT1612	Artificial Intelligence Laboratory	PC	4	0	0	4	2
8.	JIT1411	Data Analysis and Visualization Laboratory	PC	4	0	0	4	2
9.	JPT1001	Soft Skills and Aptitude II	EEC	2	0	0	2	1
TOTAL				29	17	2	10	23

SEMESTER-V

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.	JIT1601	Internet of things	PC	3	3	0	0	3
3.	JIT1014	Deep Learning	PC	3	3	0	0	3
4.	JIT1007	Machine Learning Techniques	PC	3	3	0	0	3
5.		Professional Elective I	PE	3	3	0	0	3
6.		Open Elective II	OE	3	3	0	0	3
PRACTICALS								
7.	JHS1511	Professional Communication	HS	2	0	0	2	1
8.	JAD1511	Machine Learning Laboratory	PC	4	0	0	4	2
9.	JPT1002	Technical Skills and Aptitude I	EEC	2	0	0	2	*
TOTAL				27	17	2	8	21

SEMESTER-VI

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	JAD1601	Artificial Intelligence in Natural Language Processing	PC	3	3	0	0	3
2.	JAD1602	Bio inspired Optimization techniques	PC	3	3	0	0	3
3.	JAD1603	Information Security for Data Science	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.	JAD1611	Artificial Intelligence in Natural Language Processing Laboratory	PC	4	0	0	4	2
8.	JPT1002	Technical Skills and Aptitude II	EEC	2	0	0	2	1
9.	JAD1621	Mini Project	EEC	2	0	0	2	1
10.	JAD1641	Internship	EEC	2	-	-	2	1
TOTAL				28	18	0	10	23

SEMESTER-VII

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	JAD1701	Adaptive Intelligent Systems	PC	3	3	0	0	3
2.	JAD1702	Web Application Framework	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	-
PRACTICALS								
7.	JAD1712	Web Application Framework Laboratory	PC	4	0	0	4	2
8.	JBA1711	Entrepreneurship for Engineers	EEC	2	0	0	2	1
9.	JAD1731	Project Work Phase I	EEC	6	0	0	6	3
TOTAL				30	18	0	12	21

SEMESTER-VIII

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	JNC1861	Indian Constitution	NCM	3	3	0	0	-
PRACTICALS								
2.	JAD1851	Comprehension and Technical Seminar	EEC	2	0	0	2	1
3.	JAD1832	Project Work Phase II	EEC	18	0	0	18	9
TOTAL				23	3	0	20	10

B.TECH ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

R-2021- CURRICULUM 2019

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	1	1	1	1	1	-	12
2	BS	10	6	3	3	3	-	-	-	25
3	ES	10	13	-	-	-	-	-	-	23
4	PC	-	-	16	16	11	11	8	-	62
5	PE	-	-	-	-	3	6	6	-	15
6	OE	-	-	-	3	3	3	3	-	12
7	EEC	-	-	-	-	-	2	3	10	15
TOTAL		23	23	20	23	21	23	21	10	164
Non Credit Mandatory			1Sub.					1Sub.	1Sub.	

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

Course Objectives:

➢ To enable the students of Engineering and Technology to develop their listening skill by learning thekey 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   6
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   6
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   6
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, makingsuggestions

UNIT IV BASIC GRAMMER AND LANGUAGE DEVELOPMENT   6
Subject-verb agreement - Modal verbs - Phrasal verbs - Single word substitutes - Use of abbreviations &acronyms - Cloze reading - Interpreting visual material, Jumbled sentences

SOFT SKILL LAB   3

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

UNIT V BASIC GRAMMAR V AND FREE WRITING 6

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 SKILL LAB 3

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

TOTAL: 45 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 Bookfor 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.

REFERENCE BOOKS:

1. Raman, Meenakshi & Sangeetha Sharma, Technical Communication: English Skills for Engineers. Oxford University Press, New Delhi. 2011.

2. Regional Institute of English. English for Engineers. Cambridge University Press, New Delhi. 2006

3. Rizvi M, Ashraf. Effective Technical Communication. Tata McGraw-Hill Publishing Company Limited, New Delhi, 2007.

4. Rutherford, Andrea J. Basic Communication Skills for Technology. Pearson Edition (II Edition), New Delhi, 2001.

Reference Books for Soft Skills Lab – I:
1.   Mandel, Steve. Effective Presentation Skills. New Delhi: Viva Books Pvt. Ltd., 2004.
2.   Kilmet, Stephen. "The Resume and "The Computerized Resume." In Writing for Design Professionals.
3.   Writing Cover Letters-Kilmet, Stephen. "Cover Letter," and "Enclosures and Attachments." In Writing for Design Professionals. New York
4.   Writing a Proposal "Standard Proposal for Funding." in Writing in the Disciplines. Fort

	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 CALCULUS (Common to all B.E /B.Tech Programmes)	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 on concepts of differential and integral calculus as tools required forapplications in engineering.
- To introduce ordinary differential equations which is widely used in problem solving and engineeringapplications.

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 similarity and orthogonal transformations – Reduction of a quadratic form to canonical form – Nature of quadratic forms.

UNIT   II   FUNCTIONS OF SEVERAL VARIABLES   **12**
Partial differentiation – Total derivative – Jacobians – Taylor's series for functions of two variables – Maximaand minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT III APPLICATIONS OF DIFFERENTIAL CALCULUS **12**

Curvature and radius of curvature – Circle of curvature – Evolutes – Envelopes – Evolute as envelope of normals.

UNIT IV APPLICATIONS OF INTEGRAL CALCULUS **12**

Multiple integrals: Double integrals – Change of order of integration – Change of variables – Area enclosed by plane curves – Triple integrals – Volume of solids.
Improper integrals: Beta and Gamma Integrals – Definitions and properties – Simple problems.

UNIT V ORDINARY DIFFERENTIAL EQUATIONS **12**

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Method of undetermined coefficients - Homogeneous equation of Euler's and Legendre's type – System of simultaneous first order linear differential equations with constant coefficients.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, students will be able
- To understand applications of matrix theory in quadratic forms
- To use calculus for problems and applications dealing with functions of several variables
- To apply differential calculus in practical problem solving in the area of geometry
- To gain insight on the applications of multiple integrals in area and volume problems
- To solve ordinary differential equations that occur in many physical and 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. 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, Newdelhi, 3rd Edition, 2007.
3. Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.
4. Weir, M.D and Joel Hass, "Thomas Calculus", 12th Edition, Pearson India, 2016.

WEB REFERENCES
1. https://nptel.ac.in/courses/111/108/111108157/
2. https://nptel.ac.in/courses/111/107/111107108/
3. https://nptel.ac.in/courses/111/104/111104144/
4. https://nptel.ac.in/courses/111/105/111105122/
5. https://nptel.ac.in/courses/111/107/111107111/

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

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

COURSE OBJECTIVES:

To enable the students to understand the basics of the latest advancements in
PhysicsTo introduce the principles of quantum mechanics
To impart knowledge of laser and fiber optic communication

UNIT   I   CRYSTAL PHYSICS   9

Single crystal, Polycrystal and Amorphous materials – Single Crystals: Unit cell, Crystal systems, Bravais lattices, Directions and Planes in a crystal, Miller indices – Inter planar distances – Co ordination number and Packing factor for SC, BCC, FCC, HCP and

Diamond structures - Crystal imperfections: Point defects, Line defects – Burgers vector, Stacking faults –- Growth of single crystal: Solution and Melt growth techniques.

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 - I-shaped girders.

UNIT   III   ULTRASONICS   9

Production of ultrasound by Magnetostriction effect and Piezo electric 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, Medical applications - Sonograms.

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)-Industrial and Medical Applications – 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 and experimental verification –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 -Electron microscope - 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 ultra sonics 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. Pandey, B.K. & Chaturvedi, S. "Engineering Physics". Cengage Learning India, 2012.

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'.
4. W.H.Freeman, 2007
5. Rajendran V, "Engineering Physics", Tata McGraw Hill, 2009.
6. Arumugam M, "Materials Science", Anuradha Publications, 2015.
7. Willam F Smith, "Material Science and Engineering", Tata McGraw - Hill Publications, 2008.
8. John D.Cutnell, "Cutnell and Johnson Physics", Willey Publications, 2018.

WEB SITE 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 OBJECTIVE

- 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 – atomic absorption spectroscopy – principles – instrumentation – applications.

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) – Break point chlorination- Treatment of water for domestic use- 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- 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. Techniques of polymerization: Bulk, emulsion, solution and suspension. Bio degradable 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.

COURSE OUTCOMES

- Students understood topics like fluorescence/phosphorescence and their mechanism, laws of photochemistry. From instrumental techniques students understood about their principles and applications in various fields.
- To understand the basic principle of water treatment and techniques involved in purification process for future learning.
- Based on electrochemical reactions, students understood the corrosion of materials, control and Prevention methods.

- The knowledge gained on polymer chemistry will help the students to differentiate the types of polymers and polymerization reactions. Preparative methods of some biodegradable polymers and their applications are clearly understood. Understanding principle of batteries, its uses and different types of non conventional energy resources will give an idea and development of new energy resources .

- The knowledge gained on engineering materials will facilitate better understanding of engineering processes and applications for further learning. Students understood about the unique behavior of nano materials from its bulk materials, also understood about various synthetic methods of nano materials and their applications.

TEXT BOOKS:

1. Jain P.C. and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2010.
2. R.Gopalan, D.Venkapayya, Sulochna Nagarajan,Text book of Engineering Chemsitry, Vikas publishing pvt ltd, 4th edition, 2013.

REFERENCES:

1. K.Sesha Maheswaramma, Mridula Chugh, Engineering chemistry, Pearson, 2016.
2. O.G.Palanna, Engineering Chemistry, Mc Graw Hill, 2017
3. Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2013.
4. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company, Ltd., NewDelhi, 2008.
5. Gowariker V.R. , Viswanathan N.V. and Jayadev Sreedhar, "Polymer Science", New Age International P (Ltd.,), Chennai, 2006.
6. Ozin G. A. and Arsenault A. C., "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.
7. B.R.Puri, L.R.Sharma, Madan S.Pathana, Principle of physical chemistry, 47th edition, Vishal publishing Co, 2017.

Website reference:
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.Tech Programmes	L	T	P	C
		3	0	0	3

Course Objectives

To impart knowledge on

- Essentials of Civil Engineering and Mechanical Engineering to the students
- Electric circuits and working principles of Electrical Machines.
- Principle and characteristics of various electronic devices.
- Transducers and working of measuring instruments.

UNIT 1   BASICS OF CIVIL ENGINEERING   11

Over view of Civil Engineering- Civil engineering contributions to the welfare of society-
Specialized subdivisions in Civil engineering-Structural, Construction, Geotechnical, Environmental,
Transportation and water resources engineering.

UNIT 2   BASICS OF MECHANICAL ENGINEERING   11

Introduction to Concept of Mechanization and Automation, Robotics; Manufacturing methods- casting,
machining, forming operations. Introduction to IC Engine- working principle of Petrol and diesel engine;
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   9

Basic circuit components – Ohms Law – Kirchhoff's Law-Introduction to AC circuits – waveforms and
RMS value – power and power factor-Principles of operation 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 – Diode and Transistor as a switch –
Amplifiers.

UNIT 5 MEASUREMENTS & INSTRUMENTATION   7

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

- ☐ Understand about the various specialization civil engineering
- ☐ Undertand the energey sources and working principle of power plants and apply the kleodgeof powerplants to diagonise and solve the Engineering problem.
- ☐ To Understand the working priciple of IC Engines
- ☐ Ability to understand electric circuits and working principles of electrical machines.
- ☐ Choose appropriate instruments for electrical measurement for a specific application.

TEXTBOOKS

1. Shanmugam Gand palanichamy MS, " Basic civil and mechanical Engineering", Tata McGraw Hillpublishing Co., 2016
2. D P Kothari and I.J Nagarath, ‖Electrical Machines ―Basic Electrical and Electronics Engineering‖,McGraw Hill Education(India) Private Limited, Third Reprint ,2016.
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 Raiand Co, New Delhi, 2010.
5. H.S. Kalsi, Electronic Instrumentation, Tata McGraw-Hill, New Delhi, 2010.
6. D P Kothari and I.J Nagarath, ‖Electrical Machines ―Basic Electrical and Electronics Engineering‖,McGraw Hill Education(India) Private Limited, Third Reprint ,2016.
7. Thereja .B.L., ―Fundamentals of Electrical Engineering and Electronics‖, S. Chand & Co. Ltd.,2008.
8. A.K. Sawhney, A Course in Electrical & Electronic Measurements & Instrumentation, Dhanpat Raiand Co, New Delhi, 2010.

   Website reference:
   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 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
- To be able to use file operations in C

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 instructions. Operating system commands, file editing, compiling, linking, executing a program

UNIT II C PROGRAMMING BASICS 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 problems.

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 HOURS: 45

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. PradipDey, ManasGhosh, "Programming in C", First Edition, Oxford University Press, 2018

2. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 16th edition 2017.

REFERENCES:

1. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, PearsonEducation, 2015.
3. Dromey R.G., "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2008
4. E. Balagurusamy, "Computing Fundamentals and C Programming", McGraw-Hilllishing Company Limited, (2017).

Website Reference :

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**

PHYSICS LABORATORY

OBJECTIVES:

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

LIST OF EXPERIMENTS:
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 powderparticle
3. Determination of velocity of Ultrasound using Ultrasonic interferometer and also find thecompressibility of the given liquid
4. Determination of moment of inertia of the given circular disc and rigidity modulus of the metalwire using torsional pendulum
5. Determination of Planck' constant using different color filters
6. Determination of Wavelength of spectral lines in mercury spectrum usingspectrometer
7. Analysis of I-V Characterization of Solar cell

CHEMISTRY LABORATORY

LIST OF EXPERIMENTS
1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in watersample.
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.

OUTCOMES:

Students will be able
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 to acquire practical skills in the determination of water quality parametersthrough 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. 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

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

COURSE OBJECTIVES

The students should be made to:
Be exposed to the syntax of C.
Be familiar with programming in C.
Learn to use arrays, strings, functions, pointers, structures and unions in C.

LIST OF EXERCISES

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: 45 PERIODS

OUTCOMES

At the end of the course, the student shouldbe
able to:Write simple C Programs
Able to solve scientific problems
using CDevelop modularized
applications in C

REFERENCES:

1. Yashavant P. Kanetkar. "Let Us C", BPB Publications,16th edition 2017.

WEBSITE REFERENCE

https://www.geeksforgeeks.org/
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
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

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 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
andindustrial buildings. Safety aspects.

Plumbing Works:

(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows inhousehold 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 withdifferent 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.

II   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. Centrifugal pump
   b. Air conditioner
   c. Internal combustion engine (2 Stroke and 4 Stroke)
   d. Transmission system for diesel engine
   e. Braking systems
   f. Gear Box

Demonstration on:
(a) Smithy operations, upsetting, swaging, setting down and bending. Example –
Exercise –Production ofhexagonal 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)

III   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 earth resistance for electrical equipment.

IV   ELECTRONICS ENGINEERING PRACTICE   16

   1. Study of Electronic components– Resistor, capacitor and inductor-colour coding.
   2. Measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
   3. Study of logic gates AND, OR, NOT, NAND, NOR, EX-OR and EX-NOR.
   4. Generation of Clock Signal.
   5. Soldering practice – Components Devices and Circuits – Using general purpose PCB.

TOTAL: 60 PERIODS

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

Course Outcomes:

- On successful completion of this course, the student will be able to fabricate carpentry components and pipe connectionsincluding plumbingworks.
- Illustrate on centrifugal pump, Air conditioner, operationsof smithy,foundry and fittings
- Carry out basic home electrical works and appliances
- Measure the electrical quantities
- Elaborate on the components, gates, soldering practices.

Web site 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

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 IV Technical 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

39

UNIT   V   Technical 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 longterm 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 andEngineers. Orient Black Swan, Chennai.
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. OrientBlack Swan Publications, Chennai, 2011.

Reference Books:

1. Rizvi, M. Ashraf, "Effective Technical Communication", Tata McGraw – Hill, 2006.
2. Ibbotson, Mark, "Cambridge English for Engineering", Cambridge University Reference Press,2008
3. Richard Johnson-Sheehan, "Technical Communication Today" 4th Edition Books LongmanPublishing Group, 2011.
4. Kenton, Sharon & Deborah Valentine, "Cross Talk: Communicating in a MulticulturalWork place",Prentice Hall, 1996.
5. English, Laura M & Sarah Lynn, "Business Across Cultures: Effective Communication Strategies",Addison Wesley, 1995.

Reference Books for Soft Skills Lab – II:

1. Richard Johnson-Sheehan, "Technical Communication Today" 4th Edition Books Longman Publishing Group, 2011
2. Porter, Patricia A., and Margaret Grant, "Communicating Effectively in English: Oral Communicationfor Non-Native Speakers", 2nd Edition, Wadsworth, 1992.
3. Alley, Michael, "The Craft of Scientific Presentations: Critical Steps to Succeed and CriticalErrors toAvoid", 1st Edition, Springer, 2007.
4. Gopalaswamy, Ramesh & Ramesh Mahadevan. ACE of Soft Skills: Attitude, Communication andEtiquette for Success, New Delhi: Pearson, 2010.

Extensive Reading:

Wells, H.G. The Time Machine, Peacock, India, 2008.

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

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	2	0	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, Eigenvalues, Eigenvectors 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 – Nonhomogeneous 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 PERIOD

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.
4. Kolman, B. Hill, D.R., ―Introductory Linear Algebra, Pearson Education, New Delhi, First Reprint, 2009.

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. Kumaresan, S., ―Linear Algebra – A Geometric Approach, Prentice – Hall of India, New Delhi, Reprint, 2010.
4. Lay, D.C., ―Linear Algebra and its Applications, 5th Edition, Pearson Education, 2015.
5. O'Neil, P.V., ―Advanced Engineering Mathematics, Cengage Learning, 2007.
6. Strang, G., ―Linear Algebra and its applications, Thomson (Brooks/Cole), New Delhi, 2005.
7. Sundarapandian, V. ―Numerical Linear Algebra, Prentice Hall of India, New Delhi, 2008.

WEB REFERENCES:
5. https://nptel.ac.in/courses/111107105/
6. https://nptel.ac.in/courses/108104174/
7. https://nptel.ac.in/courses/111104137/
8. https://nptel.ac.in/courses/111106135/
9. 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 about the principles in various analytical techniques.

UNIT   I   SEMICONDUCTING MATERIAL   8
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 –— Hall effect –Determination of Hall coefficient – Applications.

UNIT   II   MAGNETIC AND SUPERCONDUCTING MATERIALS   8
Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism – Domain theory –
Hysteresis – Soft and Hard magnetic materials – Antiferromagnetic materials – Ferrites and its applications - Superconductivity: properties – Type I and Type II superconductors – BCS theory of superconductivity (Qualitative) – High Tc superconductors – Applications of Superconductors – SQUID, Cryotron, Magnetic levitation.

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 – Optical data storage techniques.

UNIT   IV   CHEMICAL BONDING AND CONDUCTIVITY IN SOLIDS   11
Valence bond theory-concept of hybridization (sp, sp^2 and sp^3) - Molecular orbital theory-energy level diagram for H_2, N_2, O_2. Band theory - Salient feature-Application of band theory (conductor, semiconductor, insulator)-Semicondutor- Types (intrinsic and extrinsic) - Band energy levels for pure silicon crystal, band model of n-type and p-type semiconductanceof 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   11
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)

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-wedgesetup
3. Analysis of I-V Characterization of Solar cell
4. Determination of energy gap of the given semiconductor by plotting the graph between current andtemperature
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)

1. Determination of strength of hydrochloric acid using pH meter.
2. Determination of strength of acids in a mixture of acids using conductivity meter.
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 flame photometer.
7. Determination of SAP and FAV values of an oil.
8. Estimation of acetic 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 invarious 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 instrumentalanalysis
- Acquire practical knowledge on interference pattern, semiconductor devices, solar cells andinstrumental 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., NewDelhi, 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. K.SeshaMaheswaramma, MridulaChugh, Engineering chemistry, Pearson, 2016.
4. O.G.Palanna, Engineering Chemistry, Mc Graw Hill, 2017.
5. Gurdeep R.Chatwal, Sham K. Anand, Instrumental methods of chemical analysis, HimalayaPublishing House, 2007.
6. Practical Fiber Optics, D. Bailey and E. Wright, 2003.
7. J.Mendham, RC Denney, JD Barnes, MJK Thomas, Text book of quantitative chemical analysis,Vogel's, 2008.
8. Quantitative and qualitative analysis, U.Alexeyer, MIR publication, Moscow (1979). AnalyticalChemistry, Gary D.Christian, Wiley, 2005.

WEBSITE LINK

1.https://nptel.ac.in/courses/115/102/115102025/

2.https://www.youtube.com/watch?v=6QUFuZpCgG

w3.http://tiny.cc/0vhjuz

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 1   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, DataType Conversion

Unit 2   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

Unit 3   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 4   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 5   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

Co1 : To understand the evolution of Python and run basic python programs.

Co2 : To structure simple python programs for solving programs.

Co3 : To Decompose larger programs into functions.

Co4 : To Understand compound structures like list, tuple,

dictionary.

Co5 : To Learn basic 2D graphics concepts in Python.

Textbooks :

1. 1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updatedfor 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 forPython 3. 2, Network Theory Ltd., 2011.

References :

1. John V Guttag, ―Introduction to Computation and Programming Using Python'', Revised andexpanded 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 ProblemSolving Focus, Wiley India Edition, 2013.
6. Paul Gries, Jennifer Campbell and Jason Montojo, ―Practical Programming: An Introductionto Computer Science using Python 3‖, Second edition, Pragmatic Programmers, LLC, 2013.

Web site References:

1. https://www.w3schools.com/python/python_reference.asp
2. https://www.pythonforbeginners.com/basics/python-websites-tutorials
3. https://www.programiz.com/python-programming/methods/built-in/list
4. https://www.geeksforgeeks.org/python-convert-dictionary-to-list-of-tuples/
5. https://www.javatpoint.com/python-exception-handling

CO-PO Mapping

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

JCS 1301	DATA STRUCTURES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To Understand basic concepts of Data structures
- To design abstract data structures using Linear data structures
- To implement tree and other non linear data Structures
- To elucidatate Graph a non linear data Structures
- To implement different sorting and searching algorithms

UNIT I   DATA STRUCTURES IN C –LISTS   **9**

Dynamic memory allocation using malloc (), free() - Pointers to Structure - Introduction to Data Structures– Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation – Singly linked lists- Circularly linked lists– Doubly-linked lists – Applications of lists – Polynomial Manipulation

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

Stack ADT – Array implementation of stack – Linked List implementation of stack– Applications of stack ADT– Infix to Postfix Notation, Evaluating arithmetic expressions – Queue ADT – Array implementation of Queue – Linked List implementation of Queue – Circular queue – Applications of queues

UNIT III   NON-LINEAR DATA STRUCTURES- TREES   **9**

Tree ADT –Tree terminologies – Binary Tree ADT- Tree traversals – Expression trees – Binary search tree ADT - AVL Trees – Complete binary tree – Full binary tree-Heap – Priority queue Using Heap –B-Tree - B+Tree

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

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-Minimum spanning trees- Prim's Algorithm-Kruskal's Algorithm

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

Searching- Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort 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", 2ndEdition, PearsonEducation,2014.
2. YashavantKanetkar, "Understanding Pointers in C & C++", 5th Revised & Updated Edition,BPB Publications,2018.

REFERENCES

1. Reema Thareja, "Data Structures Using C", Second Edition, Oxford University Press, 2014.
2. E.Balagurusamy , " Data Structures Using C", McGraw Hill Education; First edition 2017.
3. Jeri R. Hanly, Elliot B. Koffman, "Problem Solving and Program Design in C",7th Edition,2012, Prentice-Hall.
4. A.K Sharma, "Data Structures using C", Second Edition,Pearson Education India 2013.
5. Aaron M. Tenenbaum , YedidyahLangsam, Moshe J. Augenstein, "Data Structures Using C",Pearson Education; First edition 2019.
6. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education, 2002.

WEBSITE LINKS

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

PO Mapping

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

JGE1212	ENGINEERING GRAPHICS & DESIGN (Common to all B.E /B.Tech Programmes)	L	T	P	C
		2	0	4	3

AIM : To develop graphic skills in students.

OBJECTIVES : To develop in students' graphic skill for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

UNIT I PLANE CURVES AND FREE HAND SKETCHING   12
Curves used in engineering practices:
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.

Free hand sketching:
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 12
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   12
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 12
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 cutouts, perpendicular to the axis.

UNIT V   ISOMETRIC AND PERSPECTIVE PROJECTIONS12

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 : 60 PERIODS

COMPUTER AIDED DRAFTING:
Using AutoCAD Software and Simple 2D Sketches.

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, 50thEdition,2010

REFERENCES:
1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill PublishingCompany 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 EconomyEdition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4. N S Parthasarathy and Vela Murali, "Engineering Graphics", Oxford University, Press, NewDelhi, 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**

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 cleansustainable 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 ofinformation 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, PearsonEducation, 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,Hydrabad, 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

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, 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

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
representingcompound data.
Draw 2D graphic diagrams in Python.

WEBSITE REFERENCE:

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

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

COURSE OBJECTIVES

- To implement linear and non-linear data structures
- To identify and implement appropriate data 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. Infix to Postfix conversion
8. Circular queue
9. Binary Search Trees and Tree traversals
10. AVL Trees
11. BFS and DFS of a graph
12. Bubble sort, Selection sort, Insertion sort using Python
13. Linear search and Binary search using Python
14. Hashing-Linear Probing and Quadratic Probing

TOTAL : 60 PERIODS

COURSE OUTCOMES

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

- Identify appropriate data structures for specified problem definition
- Implement operations like searching, insertion, deletion, traversing mechanism etc. on various data structures
- Apply appropriate linear / non -linear data structure operations for solving a given problem
- Implement appropriate sorting/searching technique for given problem
- Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval

TEXT BOOKS

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

WEBSITE LINKS
1. https://www.geeksforgeeks.org/data-structures/
2. https://nptel.ac.in/courses/106/106/106106130/
3. https://www.tutorialspoint.com/python_data_structure/

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

HARDWARE

Standalone desktops 30 Nos. (or) Server supporting 30 terminals or more

SOFTWARE
Ubuntu C / Python3

CO-PO Mapping

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

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 DECOMPOSITIONS 12

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: 45 HOURS

COURSE OUTCOMES:

At end of the course students will be able to:

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

WEBSITE REFERENCES :
. 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 AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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	-	-

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

COURSE OBJECTIVES:
- To learn the working of various data models and get exposed to SQL querying
- To design database with ER models 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 Database System – Views of data – Data Models – Database System Architecture- Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL.

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 – SQL Facilities 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 – Query Processing Overview – Query optimization

UNIT-V : ADVANCED DATABASE SYSTEMS   9

Distributed Databases Architecture – DataStorage – Transaction Processing – Object-based Databases Object Database Concepts – Object-Relational Features – ODMG Object Model – ODL –

OQL XML Databases – XML Hierarchical Model – DTD – XML Schema – XQuery –Database Connectivity – Fundamentals of Database security.

TOTAL: 45 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
> **CO1 :·** Design efficient databases and extract information with SQL queries
> **CO2 :** Develop preliminary design of normalized databases
> **CO3 :** Analyze the various transactions and provide smooth access of data
> **CO4 :** Create organized databases and write optimized queries
> **CO5 :** Learn the various advanced database concepts and security

TEXT BOOKS:
1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Seventh Edition, Tata McGraw 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 McGraw Hill, 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/**

CO-PO AND CO-PSO MAPPING:

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

JAD1301	FOUNDATION OF DATA SCIENCE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:
- To understand the data science process and the different roles involved in a data science.
- To understand the concept of correlation and its representation through scatter plots.
- To develop skills in creating line plots, scatter plots, density plots, contour plots, and histograms..
- To Learn data manipulation techniques using Pandas.
- To Learn techniques for visualizing segmentations and representing trees as sets of rules.

UNIT-I INTRODUCTION   9
Data science process, roles, stages in data science project, working with data from files, working with relational databases, exploring data, managing data, cleaning and sampling for modeling .Introduction to R: Introduction to various data types, numeric, character, date, data frame, array, matrix etc., reading and writing datasets, working with different file types .txt, .csv, outliers, R functions and loops

UNIT-II DESCRIBING RELATIONSHIPS   9
Correlation–Scatter plots –correlation coefficient for quantitative data –computational formula for correlation coefficient – Regression –regression line –least squares regression line – Standard error of estimate – interpretation of r2 –multiple regression equations – regression towards the mean

UNIT-III DATA VISUALIZATIONS   9
Importing Matplotlib – Line plots – Scatter plots – visualizing errors – density and contour plots – Histograms – legends – colors – subplots – text and annotation – customization – three dimensional plotting - Geographic Data with Basemap - Visualization with Seaborn

UNIT-IV PYTHON LIBRARIES FOR DATA WRANGLING   9
Basics of Numpy arrays –aggregations –computations on arrays –comparisons, masks, boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – Hierarchical indexing – combining datasets – aggregation and grouping – pivot tables

UNIT-V PREDICTIVE MODELING   9

Models, Induction, and Prediction-Visualizing Segmentations-Trees as Sets of Rules-Probability Estimation-Fitting a Model to Data: Classification via Mathematical Functions-Regression via Mathematical Functions-Class Probability Estimation and Logistic Regression

TOTAL: 45 HOURS

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

CO1 : Gain a comprehensive understanding of the data science process, including its stages and key roles.

CO2 : Develop a clear understanding of correlation and its significance in analyzing relationships between variables.

CO3 : Learn how to create line plots, scatter plots, density plots, contour plots, and histograms using appropriate tools and libraries.

CO4 : Learn how to perform data indexing, selection, and operations on datasets

CO5 : Understand how to visualize segmentations in data using appropriate techniques.

TEXT BOOKS:
1. Foster Provost & Tom Fawcett, "Data Science for Business",Published by O'Reilly Media, Inc.
2. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2018
3. Robert Kabacoff, "R in Action: Data Analysis and Graphics with R"

REFERENCES:

1. Jake VanderPlas, "Python Data Science Handbook", O'Reilly, 2016
2. Matt Harrison, "Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization , O'Reilly, 2016.
3. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media, 2015.
4. Dr. Tania Moulik, "Applied Data Visualization with R and ggplot2", September 2018
5. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017.

WEBSITE REFERENCES :
1. https://rdrr.io/cran/IPSUR/f/inst/doc/IPSUR.pdf
2. https://www.oreilly.com/library/view/applied-data-visualization
3. https://www.oreilly.com/library/view/doing-data-science/9781449363871/
4. https://pg-p.ctme.caltech.edu/data-science-course-certification
5. https://www.mygreatlearning.com/srm-mtech-data-science

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
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CO2	3	3	2	3					3		2	3	3	3
CO3	3		3	3								3	3	3
CO4	3	3		3					3		2		3	3
CO5	3	2			2				3		3		3	3
AVG	3	2.7	2.5	3	2				3		2.2	3	3	3

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

COURSE OBJECTIVES:
- To understand the basic concepts of Object Oriented Programming in Java
- To know the principles of inheritance 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 using swing components

UNIT-I   : INTRODUCTION TO OOP AND JAVA FUNDAMENTALS   9
Object Oriented Programming –objects and classes –features of OOP-OOP in Java –Characteristics of Java –The Java Environment -Java Source File–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 INTERFACES   9
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 inheritance strings and array List

UNIT-III : EXCEPTION HANDLING AND I/O   9
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   : MULTITHREADING, GENERIC PROGRAMMING AND ADVANCED JAVA
9

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

UNIT-V   : EVENT DRIVEN PROGRAMMING   9
                Graphics programming -Frame –Components -working with 2D shapes -Using color, fonts, and images -Basics of event handling - event handlers - adapter classes - actions -mouse events -AWT event hierarchy - Introduction to Swing –layout management -Swing Components –Text Fields, Text Areas –Buttons - Check Boxes – Radio Buttons –Lists-choices-Scrollbars –Windows –Menus– Dialog Boxes, Case study - Program using AWT components and Swing Components.

TOTAL : 45 HOURS

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, Mobile no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of 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 ArrayList.
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 a value 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 JAVA AWT components.

TOTAL: 15 HOURS

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

CO1 : Develop Java programs using OOP principles
CO2 : Develop Java programs using inheritance and interfaces concepts
CO3 : Build Java applications using exceptions, I/O streams and Java beans
CO4 : Develop Java applications with threads and generic classes
CO5 : Develop interactive applications using swings

TEXT BOOKS:
1. Herbert Schildt, "Java The complete reference", 11th Edition, McGraw Hill Education, 2017.
2. Cay S. Horstmann, Gary cornell, "Core Java Volume –I Fundamentals", 9th Edition, Prentice Hall, 2013.

REFERENCES:
1. Paul Deitel, Harvey Deitel, "Java SE 8 for programmers", 3rd Edition, Pearson, 2015
2. Steven Holzner, "Java 2 Black book", Dreamtech press, 2011.

WEBSITE 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

CO-PO AND CO-PSO MAPPING:

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CO3	3	2	3	-	-	3	3	2	3	3	3	3	3	2
CO4	1	3	3	-	-	3	2	3	3	2	3	2	3	3
CO5	3	3	3	-	-	2	3	3	2	3	2	3	2	3
AVG	2.6	2.6	3	1	2	2.4	2.6	2.6	2.6	2.4	2.6	2.4	2.6	2.6

		L	T	P	C
JCS1404	**SOFTWARE ENGINEERING**	**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 : SOFTWARE PROCESS AND AGILE DEVELOPMENT   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 : REQUIREMENTS ANALYSIS AND SPECIFICATION   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 : SOFTWARE DESIGN   9
Design process – Design Concepts – Design Model– Design Heuristic – Architectural Design Architectural Styles– Architectural Mapping using Data Flow- User Interface Design – 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 Plan Planning Process– RFP Risk Management–Identification–Projection–Risk Mitigation-RMMM Plan-CASE Tools

                                                                      TOTAL: 45 HOURS

COURSE OUTCOMES:

At end of the course students will be able to:

CO1 : Identify the key activities in managing a software project compare different process
         models
CO2: Apply concepts of Requirements Engineering and Analysis Modeling
CO3 : Apply systematic procedures in software design and systems
CO4 : Compare the various testing strategies
CO5 : Handle project management system and its qualities

TEXT BOOKS:
1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Eighth Edition, McGraw-Hill International Edition, 2014.
2. Ian Sommerville, "Software Engineering", 9th Edition, Pearson Education Asia, 2011.

REFERENCES:
1. Rajib Mall, Fundamentals of Software Engineering, Third Edition, PHI Learning Private Limited, 2009.
2. Pankaj Jalote, Software Engineering, A Precise Approach, Wiley India, 2010.
3. Kelkar S.A., "Software Engineering", Prentice Hall of India Pvt Ltd, 2007.
4. Stephen R.Schach, "Software Engineering", Tata McGraw-Hill Publishing Company Limited, 2007

WEBSITE REFERENCES :
1. https://www.tutorialspoint.com/software_engineering/index.htm
2. https://www.guru99.com/software-engineering-tutorial.html
3. https://www.geeksforgeeks.org/software-engineering/
4. https://lecturenotes.in/m/21862-software-engineering-tutorial
5. /http://www.engppt.com/2011/12/pressman-software-engineering-ppt-pdf.html/

CO-PO AND CO-PSO MAPPING:

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CO4	-	2	-	-	2	-	-	2	3	-	-	3	3	3
CO5	3	3	3	-	2	2	-	2	3	3	2	3	3	3
AVG	3	2.6	3	0	2.3	2	0	2	3	3	2	2.5	3	3

		L	T	P	C
JPT1001	**SOFT SKILLS AND APTITUDE I**	**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   : SOFT SKILLS AND APTITUDE – I   5

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

UNIT-II   : SOFT SKILLS AND APTITUDE – II   5
Dimensions of Personality – Self Confidence – Open Mindedness – Acceptance – Creativity - Strategies for developing creativity – Overcoming myths of creativity – Presence of Mind – Staying Focused – Self Acceptance – Self Growth

UNIT-III : QUANTITATIVE APTITUDE   **5**

Number system – Divisibility Rule – Simplification – Surds and Indices – Square root and Cube root – Averages – Percentage

UNIT-IV : LOGICAL REASONING   **5**

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

UNIT-V : TECHNICAL APTITUDE IN C-I   **5**
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: 30 HOURS
COURSE OUTCOMES:
At end of the course students will be able to:
    CO1 : Build better relationship with all in their social settings
    CO2 : Engage in creative activities focusing on their career
    CO3 : Solve the real time and complex problems in aptitude
    CO4 : Solve critical reasoning and real time application problems
    CO5 : Apply their knowledge in the basics of C programming

TEXT BOOKS:
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, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009.
5. Yashavant P. Kanetkar, "Let Us C", BPB Publications, 2011.

WEBSITE 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/coding and decoding
5. https://www.youtube.com › watch/c programs
6. https://www.youtube.com › watch/self confidence
7. https://www.youtube.com › watch/motivation

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
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CO3	-	2	3	2	-	-	1	3	2	1	-	-	-	-
CO4	-	2	3	2	-	-	1	3	2	1	-	-	-	-
CO5	-	2	3	2	-	-	1	3	2	1	-	-	-	-
AVG	-	2	3	2	-	-	1	3	2	1	-	-	-	-

		L	T	P	C
JCS1312	**DATABASE MANAGEMENT SYSTEMS LABORATORY**	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 as MySQL database

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, Sub queries 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/SQL Triggers
7. Exception Handling
8. Database Design using ER modeling, Normalization and Implementation for any application
9. Database Connectivity with Front End Tools
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 HOURS

COURSE OUTCOMES:

At end of the course students will be able to:

CO1 : Execute typical data definitions, data control and data manipulation commands

CO2 : Familiarize with Nested and Join Queries for extracting combinatorial data

CO3 : Implement simple applications that use Views

CO4 : Develop PL/SQL procedures, functions and packages

CO5 : Develop applications using Front-end & Back-end Tools and also to handle report generation

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Seventh Edition, Tata McGraw Hill, 2020.

2. RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Sixth Edition, Pearson Education, 2015.

REFERENCES:

1. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems"Eighth Edition, Pearson Education, 2008.

2. Raghu Ramakrishnan, "Database Management Systems", Fourth Edition, McGraw- Hill College Publications, 2015.

3. G.K.Gupta,"Database Management Systems", Tata McGraw Hill, 2011

WEBSITE REFERENCES :

1. https://www.tutorialspoint.com/dbms/index.htm

2. https://www.studytonight.com/dbms/

3. http://www.ddegjust.ac.in/studymaterial/mca-3/ms-11.pdf

4. https://www.w3schools.in/dbms/https://sqlzoo.net/

LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE: Front end: Python / Visual Studio or Equivalent

Back end: Oracle / MS SQL Server / MySQL / DB2 or Equivalent

HARDWARE: Standalone desktops 30 Nos. (or) Server supporting 30 terminals or more.

CO-PO AND CO-PSO MAPPING:

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

JAD1311	DATA SCIENCE LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To Understand the R Programming Language
- To learn descriptive analytics on the benchmark data sets
- To Understand the classification and Regression Model.
- To present and classify data using classification Model.
- To do cluster classification using Clustering Model.

LIST OF PROGRAMS

1. Implement a Simple Calculator Application.
2. Working with Descriptive Statistics Using R
3. Reading Excel data sheet and XML dataset in R.
4. CO6To Plot the histogram, bar chart and pie chart on sample data
5. Find the correlation matrix.
6. Import data from web storage and implement logic regression.
7. Apply multiple regressions for data.
8. Apply regression Model techniques to predict the data on dataset.
9. Evaluate the performance of the classifier.
10. Plot the cluster data using R visualizations

COURSE OUTCOMES:

At end of the course students will be able to:

      CO1 : Make use of the python libraries for data science

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

      CO3 : Perform descriptive analytics on the benchmark data sets.

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

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

TEXT BOOKS:

1. Yanchang Zhao, "R and Data Mining: Examples and Case Studies", Elsevier, 1st Edition, 2012
2. Dr. Tania Moulik , "Applied Data Visualization with R and ggplot2"-September 2018

REFERENCES:

1. Hadley Wickham and Garrett Grolemund, ""R for Data Science".
2. Hadley Wickham, "ggplot2: Elegant Graphics for Data Analysis"
3. Andy Field, Jeremy Miles, and Zoë Field, ""Discovering Statistics Using R"
4. Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani, "An Introduction to Statistical Learning: with Applications in R".
5. Ronald S. King and Alteryx,"Cluster Analysis and Data Mining: An Introduction".

WEBSITE REFERENCES :

1. http://www.r-bloggers.com/how-to-perform-a-logistic-regression-in-r/
2. http://www.ats.ucla.edu/stat/r/dae/rreg.htm
3. http://www.coastal.edu/kingw/statistics/R-tutorials/logistic.html
4. http://www.ats.ucla.edu/stat/r/data/binary.csv
5. https://www.iare.ac.in/sites/default/files/lab1/

LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE: R Software , R Studio Software
HARDWARE: 30 numbers of Desktop Computers with 4 GB

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	3	3	-	-	-	-	2		3	3
CO2	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	-	2	-	3	3
AVG	3	3	3	-	3	3	-	-	3	-	2.5	-	3	3

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 sample tests 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 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
CO1: To understand random variables and use standard distributions in solving real time problems.
CO2: To use joint density functions to perform correlation and regression analysis.
 CO3: To apply hypothesis testing for making statistical inferences in large and small sample real life
        problems.

CO4: To use theory of estimation in practical applications and problem solving.
 CO5: To understand methods of finding correlation values between variables 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 Statistics for 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, New Delhi, 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 Hill Edition, 2004.

WEBSITE 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 AND CO-PSO MAPPING:

CO/ PO,PSO	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

JIT1602	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:
- To know the underlying structure behind
- To study the techniques of knowledge representation
- To explore the adaption of artificial intelligence techniques intelligence mathematically
- To know the logical implications in computational intelligence
- To know the automated learning techniques in real-time scenarios

UNIT-I : INTELLIGENT AGENTS AND SEARCH TECHNIQUES   9

Agents and Environments – Good Behavior: The Concepts of Rationality – The Nature of Environments– The Structure of Agents – Problem Solving by Search – Uninformed Search – Searching with Costs – Informed State Space Search – Heuristic Search: Greedy – A* Search – Problem Reduction Search – Game Search – Constraint Satisfaction Problems.

UNIT-II : REASONING WITH LOWER ORDER LOGICS   9

Logical Agent – Proposition Logic – Syntax and Semantics – Theorem Proving – Model Checking – Inference in First Order Logic: Forward Chaining – Backward Chaining – Resolution.

UNIT-III : KNOWLEDGE REPRESENTATION   9

Knowledge Representation Issues – Approaches for Knowledge Representation: Simple Relational Knowledge – Inherited Knowledge – Semantic Nets – Frames – Semantic Web – Ontology**.**

UNIT-IV : AI PLANNING AND NATURAL LANGUAGE PROCESSING   9

Classical Planning – Types – Partial Order Planning – Graph Plan and SAT Plan – Natural Language Processing Basics: Syntax – Semantics – Introduction to Statistical NLP.

UNIT-V : LEARNING AND APPLICATIONS   9

Logical Formulation of Learning – Knowledge in Learning – Explanation-based Learning – Learning using Relevance Information – Natural Language Toolkit (NLTK) - Application with NLP: Developing a Simple Chatbot – Types of Chatbot - Reinforcement Learning - Decision theory.

TOTAL: 45 HOURS

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

CO1 : To apply the search techniques to real-time problems.
CO2 : To apply the reasoning techniques to real world problems.
CO3 : To understand the representation of knowledge.

CO4 : To understand the learning techniques**.**
CO5 : To apply AI techniques in developing real world applications.

TEXT BOOKS:
1. Stuart J. Russell, Peter Norvig, "Artificial Intelligence - A Modern Approach", Third Edition, Pearson Publishers, 2015.
2. Elaine Rich, Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence", Third Edition, Tata McGraw-Hill Education, 2008**.**

REFERENCES:
1. Dheepak Khemani, "A first course in Artificial Intelligence", McGraw Hill Education Pvt Ltd., NewDelhi, 2013.
2. Steven Bird, Ewan Klein and Edward Loper, "Natural Language Processing with Python", O'Reilly, 2009, https://www.nltk.org/book/.
3. Nils J. Nilsson, "Artificial Intelligence: A New Synthesis", Morgan Kaufmaan Publishers Inc; Second Edition, 2003.
4. David L. Poole and Alan K. Mackworth, "Artificial Intelligence: Foundations of Computational Agents", Cambridge University Press, 2017.
5. George F. Luger, "Artificial Intelligence: Structures and Strategies for Complex Problem Solving", Pearson Education, 2008.

WEBSITE REFERENCES :
1. https://www.youtube.com/watch?v=kmeaG_BQZ7M&list=PLrjkTql3jnm_yol-ZK1QqPSn5YSg0NF9r
2. https://www.youtube.com/watch?v=J8Eh7RqggsU&list=PLoROMvodv4rO1NB9TD4iUZ3qghGEGtqNX
3. https://www.youtube.com/watch?v=TjZBTDzGeGg&list=PLUl4u3cNGP63gFHB6xb-kVBiQHYe_4hSi
4. https://www.youtube.com/watch?v=JMUxmLyrhSk&list=PL9ooVrP1hQOGHNaCT7_fwe9AabjZI1RjI&index=2

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	2	-	-	3	1	3
CO2	3	3	3	3	-	-	-	-	2	-	-	3	1	3
CO3	3	3	3	3	-	-	-	-	2	-	-	3	1	3
CO4	3	3	3	3	-	-	-	-	2	-	-	3	2	3
CO5	3	3	3	3	3	-	-	-	2	-	-	3	2	3
AVG	**3**	**3**	**3**	**3**	**0.6**	**0**	**0**	**0**	**2**	**0**	**0**	**3**	**1.4**	**3**

JIT1016	DATA ANALYSIS AND VISUALIZATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:
- To learn the different ways of Data Analysis
- To be familiar with Data Streams
- To understand the Mining and Clustering Concepts
- To understand the Visualization Techniques
- To learn how to explore data and data simulation.

UNIT-I : DATA ANALYSIS   9

Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics - Rule induction - Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods.

UNIT-II : MINING DATA STREAMS   9

Introduction to Streams Concepts – Stream data model and architecture - Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting oneness in a window – Decaying window - Realtime Analytics Platform(RTAP) applications - case studies - real time sentiment analysis, stock market predictions.

UNIT-III : FREQUENT ITEM SETS AND CLUSTERING   9

Mining Frequent itemsets - Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent itemsets in a stream – Clustering Techniques – Hierarchical – K- Means – Clustering high dimensional data – CLIQUE and PROCLUS – Frequent pattern based clustering methods – Clustering in non-euclidean space – Clustering for streams and Parallelism.

UNIT-IV : OVERVIEW OF DATA VISUALIZATION   9

Visualizing Data-Mapping Data onto Aesthetics, Aesthetics and Types of Data, Scales Map Data Values onto Aesthetics, Coordinate Systems and Axes- Cartesian Coordinates, Nonlinear Axes, Coordinate Systems with Curved Axes, Color Scales-Color as a Tool to Distinguish, Color to Represent Data Values ,Color as a Tool to Highlight, Directory of Visualizations- Amounts, Distributions, Proportions, x–y relationships, Geospatial Data

UNIT-V : FRAMEWORKS AND VISUALIZATION   9

MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed file systems – Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications

TOTAL: 45 HOURS

COURSE OUTCOMES:
At end of the course students will be able to:
   CO1 : Understand various approaches and techniques for data analysis

CO2 : Apply data stream processing techniques to real-time data analysis tasks

CO3 : Understand the fundamentals of data mining and clustering

CO4 : Develop skills in creating effective visual representations of data

CO5: Apply data exploration and simulation techniques to gain insights and generate realistic data for analysis.

TEXT BOOKS:

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
2. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.

REFERENCES:

1. Eric Matthes, "Data Analysis and Visualization Using Python Analyze Data to Create Visualizatiofor BI Systems.
2. Python Crash Course", 2nd Edition, May 2019
3. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analystics, John Wiley & sons, 2012.
4. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O" Reilly, 2011.
5. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.Pandas, NumPy, Scikit

WEBSITE REFERENCES :

1. https://www.geeksforgeeks.org/difference-between-data-visualization-and-data-analytics/
2. https://www.oreilly.com/library/view/data-analysis-and/9781484241097/
3. https://www.coursera.org/learn/data-visualization
4. https://www.netquest.com/hubfs/docs/ebook-data-visualization-EN.pdf
5. https://www.coursera.org/learn/python-for-data-visualization#syllabus

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	3	3	-	-	-	-	-	-	2	3	3	3	3
CO2	2	3		3	2						3		3	3
CO3		3	3	2							3	2	3	3
CO4	2	3	3		3						2		3	3
CO5	3	3	3		2						3	3	3	3
AVG	2.6	3	3	2.5	2.3					2	2.6	2.6	3	3

JCB1401	DATA COMMUNICATION AND NETWORKS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To study the fundamentals of networking.
- To learn the OSI reference model-physical layer.
- To understand Error detection and Flow control.
- To learn about routing and addressing.
- To study about transmission control and application layer protocols.

UNIT-I: INTRODUCTION TO DATA COMMUNICATION   9

 Data Communication - Networks - Network Types - The OSI Model - Layers in the OSI Model – TCP/IP Protocol Suite - Data Transmission - Analog Transmission – Digital Transmission – Transmission impairment - Wired LANs: Ethernet

UNIT-II: PHYSICAL LAYER   9

Introduction - Physical Layer - Digital data - digital signals - Analog data - Analog signals – Synchronous and Asynchronous transfer - Multiplexing - Frequency division multiplexing- Time division multiplexing - Transmission media - Twisted Pair - Coaxial cable - Optical Fibers -Wireless transmission – Microwaves - Radio waves - Infrared

UNIT-III : DATA LINK LAYER   9

Introduction - Link Layer Addressing – Framing - Flow Control - Error Control - Error Detection and Correction - Stop and Wait Protocols - Sliding Window Protocols – HDLC - Media Access Control (MAC) - Random Access - Controlled Access.

UNIT-IV   :NETWORK LAYER   9

 Network Layer Services - Packet switching - Performance - IPV4 Addresses - Network Layer Protocols: IP, ICMP v4 - Unicast Routing Algorithms - Protocols - Multicasting Basics - Congestion Control Algorithms

UNIT-V   : TRANSPORT AND APPLICATION LAYER   9

 Transport Layer Protocols - Services - Port Numbers - User Datagram Protocol - Transmission Control Protocol - DNS - Email -WWW and HTTP

TOTAL: 45 HOURS

COURSE OUTCOMES:

At end of the course students will be able to:

- Understand the concept of Computer networks and Data Transmission.
- Understand different types of protocols used for transmission of data.
- Apply error detection and flow control techniques.
- Explain different addressing and routing algorithms.
- Describe about transport layer and application layer protocols

TEXT BOOKS:

1. Behrouz Forouzan, "Data Communications and Networking", Edition 5, Tata McGraw-Hill., 2017.
2. Andrews S. Tanenbaum, David J Wetherall, "Computer Networks", Edition 5, Pearson Education, 2012.

REFERENCES:

1. William Stallings, "Data & Computer Communications", PHI, Edition 6, 2012.
2. Data Communications and Networks- 2nd edition -Achyut S Godbole- and AtulKahate Tata McGraw-Hill, 2017.
3. Computer Networking - James F. Kurose & Keith W. Ross- PEARSON, 6th EDITION, 2017.
4. Computer Communications and Networking Technologies - Michael A. Gallo & William M. Hancock- BROOKS&COLE, 2001.

WEB REFERENCES:

- https://www.tutorialspoint.com/data_communication_computer_network/data_communication_computer_network_tutorial.pdf
- https://www.sciencedirect.com/topics/computer-science/data-communication-network
- https://www.citethisforme.com/topicideas/technology/data%20communication%20and%20networking%20references-39792182
- https://link.springer.com/book/10.1007/978-1-4020-7870-5
- https://www.iitg.ac.in/eee/syllabusdetails.php?slno=WEo0emtEZHM2U0VmTkR5MXgwNU5oUT09

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	1	2	3	-	-	-	2	1	2	2	2
CO2	2	2	1	1	1	1	-	-	-	2	2	2	2	2
CO3	2	1	2	1	1	2	-	-	-	2	1	2	2	1
CO4	2	3	2	2	2	1	-	-	-	2	2	2	2	3
CO5	2	2	3	2	2	3	-	-	-	1	2	2	2	2
AVG	2	2	2	2	2	2	0	0	0	2	2	2	2	2

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   :   OPERATING SYSTEMS OVERVIEW   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 – Interprocess 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 :   MEMORY MANAGEMENT   9

Main Memory – Background – Swapping - Contiguous Memory Allocation – 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 :   FILE SYSTEM 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 – File Sharing and Protection – File Allocation Methods – Free Space Management – 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-Output Management - File System - Inter-process Communication - Mobile

OS- iOS and Android - Architecture and SDK Framework - Media Layer - Services Layer - Core OS Layer - File System

TOTAL: 45 HOURS

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

CO1 :   Classify operating system components and system calls based on functionality

CO2 :   Analyze   and   evaluate   CPU   scheduling   algorithms   and assess   the   solutions   for synchronization problems and deadlock prevention

CO3 :   Familiarize in memory management and storage management techniques

CO4 :   Analyze the File System Interface, Directory Structure and I/O systems

CO5 :   Carry out case studies to generate and illustrate different aspects of various operating systems

TEXT BOOKS:
1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2018.
2. William Stallings, "Operating Systems – Internals and Design Principles", 7th Edition, Prentice Hall, 2018**.**

REFERENCES:
1. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2014.
2. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education, 2018.
3. D M Dhamdhere, "Operating Systems: A Concept-Based Approach", Second Edition, Tata McGraw Hill Education.

WEBSITE REFERENCES :
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/

CO-PO AND CO-PSO MAPPING:

CO/ PO,PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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CO2	3	-	2	-	-	-	-	-	-	-	2	-	3	3
CO3	1	-	2	-	-	-	-	-	-	1	2	-	3	3
CO4	3	-	2	-	-	-	-	-	-	1	2	-	3	3
CO5	2	-	2	-	-	-	-	-	-	1	2	-	3	3
AVG	2.4	-	2	-	-	-	-	-	-	1.25	2	2	3	3