

# **K.L.N. COLLEGE OF ENGINEERING**

**Pottapalayam-630612, Sivagangai District**

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



**Estd: 1994**

## **CURRICULA AND SYLLABI**

**REGULATIONS 2020**

**For Under Graduate Program**

**B.Tech. – INFORMATION TECHNOLOGY**

**CHOICE BASED CREDIT SYSTEM**

**(For the students admitted from the academic year 2020-2021 onwards)**



**K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM**  
(An Autonomous Institution, Affiliated to Anna University, Chennai)



### **VISION OF THE INSTITUTION**

To become a Centre of Excellence in Technical Education and Research in producing Competent and Ethical professionals to the society.

### **MISSION OF THE INSTITUTION**

To impart Value and Need based curriculum to the students with enriched skill development in the field of Engineering, Technology, Management and Entrepreneurship and to nurture their character with social concern and to pursue their career in the areas of Research and Industry.

### **VISION OF THE DEPARTMENT**

To emerge as a center of excellence through innovative technical education and research in Information Technology.

### **MISSION OF THE DEPARTMENT**

To produce competent Information Technology professionals to face the industrial and societal challenges by imparting quality education with ethical values.



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### **PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

- PEO1** To excel in industrial or graduate work in Information Technology and multi-disciplinary Environments.
- PEO2** To adapt to ever changing technologies by applying Engineering Principles.
- PEO3** To practice professionalism conforming to ethical values, team work and Leadership.

### **PROGRAM SPECIFIC OUTCOMES (PSOs)**

- PSO1** To create better learning environment in line with technological updation and research progress.
- PSO2** To give industry exposure through research and consultancy in Information and Communication Technologies.



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**PO1: Engineering knowledge**

Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2: Problem analysis**

Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3: Design/development of solutions**

Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4: Conduct investigations of complex problems**

Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5: Modern tool usage**

Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6: The engineer and society**

Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7: Environment and sustainability**

Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8: Ethics**

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9: Individual and team work**

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10: Communication**

Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11: Project management and finance**

Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12: Life-long learning**

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



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**REGULATIONS 2020**  
**For Under Graduate Program**  
**B.Tech. – INFORMATION TECHNOLOGY**  
**CHOICE BASED CREDIT SYSTEM**

**CATEGORY OF COURSES**

- i. **Humanities and Social Sciences (HS) Courses** include Technical English, Environmental Science and Engineering, Engineering Ethics and human values, Communication Skills and Management courses.
- ii. **Basic Sciences (BS) Courses** include Mathematics, Physics, and Chemistry.
- iii. **Engineering Sciences (ES) Courses** include Engineering Practices, Engineering Graphics, Basics of Electrical / Electronics / Mechanical / Computer Engineering / Instrumentation etc.
- iv. **Professional Core (PC) Courses** include the core courses relevant to the chosen programme of study.
- v. **Professional Elective (PE) Courses** include the elective courses relevant to the chosen programme of study.
- vi. **Open Elective (OE) Courses** include courses from other departments which a student can choose from the list specified in the curriculum of the students B.E. / B.Tech. Programmes.
- vii. **Employability Enhancement Courses (EEC)** include Project Work and/or Internship, Seminar, Professional Practices, Case Study and Industrial/Practical Training.
- viii. **Mandatory (MC) Courses** include Personality and Character development and the courses recommended by the regulatory bodies such as AICTE, UGC, etc

**SEMESTER I**

(Common to all B.E/B.Tech Programmes)

S. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
<b>THEORY</b>								
1	20HS101	<a href="#">English for Technical Communication</a>	HS	3	3	0	0	3
2	20BS101	<a href="#">Fundamentals of Engineering Mathematics</a>	BS	4	3	1	0	4
3	20BS102	<a href="#">Engineering Physics</a>	BS	3	3	0	0	3
4	20BS103	<a href="#">Engineering Chemistry</a>	BS	3	3	0	0	3
5	20GE101	<a href="#">Problem Solving using Python Programming</a>	ES	3	3	0	0	3
<b>PRACTICAL</b>								
6	20BS1L1	<a href="#">Basic Science Laboratory</a>	BS	3	0	0	3	1.5
7	20GE1L1	<a href="#">Python Programming Laboratory</a>	ES	4	0	0	4	2
8	20GE1L2	<a href="#">Industrial Practices Workshop</a>	ES	3	0	0	3	1.5
<b>TOTAL</b>				<b>26</b>	<b>15</b>	<b>1</b>	<b>10</b>	<b>21</b>

**SEMESTER II**

S. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C
<b>THEORY</b>								
1	20HS201	<a href="#">Advanced Technical Communication</a> (Common to all B.E/B.Tech programmes)	HS	3	3	0	0	3
2	20BS201	<a href="#">Laplace Transform and Advanced Calculus</a> (Common to all B.E/B.Tech programmes)	BS	4	3	1	0	4
3	20BS204	<a href="#">Physics for Information Science</a> (Common to B.E CSE & B.Tech IT programmes)	BS	3	3	0	0	3
4	20GE201	<a href="#">Engineering Graphics</a> (Common to all B.E/B.Tech programmes)	ES	4	2	0	2	3
5	20GE205	<a href="#">Basic Electrical and Electronics Engineering</a> (Common to B.E CSE, B.Tech IT & B.Tech AIDS programmes)	ES	3	3	0	0	3
6	20CS201	<a href="#">Programming in C</a> (Common to B.E EEE, B.E EIE, B.E CSE, B.Tech IT & B.Tech AIDS programmes)	PC	3	3	0	0	3
<b>PRACTICAL</b>								
7	20HS2L1	<a href="#">Communication Skills Laboratory</a> (Common to B.E Mech, B.E AUE, B.E CSE, B.Tech IT & B.Tech AIDS programmes)	HS	2	0	0	2	1
8	20CS2L1	<a href="#">C Programming Laboratory</a> (Common to B.E EEE, B.E EIE, B.E CSE, B.Tech IT & B.Tech AIDS programmes)	PC	4	0	0	4	2
<b>TOTAL</b>				<b>26</b>	<b>17</b>	<b>1</b>	<b>8</b>	<b>22</b>

SEMESTER III

SL NO	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
<b>THEORY</b>								
1	20BS303	<a href="#">Discrete Mathematics</a>	BS*	4	3	1	0	4
2	20CS301	<a href="#">Digital Principles and System Design</a>	ES*	4	3	1	0	4
3	20CS302	<a href="#">Data Structures and Algorithms</a>	PC*	3	3	0	0	3
4	20IT301	<a href="#">Object Oriented Programming</a>	PC	3	3	0	0	3
5	20HS301	<a href="#">Universal Human Values</a> (Common to all B.E./B.Tech programmes)	HS	3	2	1	0	3
<b>PRACTICALS</b>								
6	20CS3L1	<a href="#">Digital Systems Laboratory</a>	ES*	4	0	0	4	2
7	20CS3L2	<a href="#">Data Structures and Algorithms Laboratory</a>	PC*	4	0	0	4	2
8	20CS3L3	<a href="#">Object Oriented Programming Laboratory</a>	PC*	4	0	0	4	2
<b>TOTAL</b>				<b>29</b>	<b>14</b>	<b>3</b>	<b>12</b>	<b>23</b>

SEMESTER IV

SL NO	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
<b>THEORY</b>								
1	20BS404	<a href="#">Probability and Statistics</a>	BS	4	3	1	0	4
2	20CS401	<a href="#">Computer Organization and Architecture</a>	PC*	3	3	0	0	3
3	20CS402	<a href="#">Database Management Systems</a>	PC*	3	3	0	0	3
4	20IT401	<a href="#">Design and Analysis of Algorithms</a>	PC	3	3	0	0	3
5	20HS401	<a href="#">Environmental Science and Engineering</a> (Common to all B.E./B.Tech programmes)	HS	2	2	0	0	2
<b>THEORY CUM PRACTICAL</b>								
6	20CS404	<a href="#">Operating Systems</a>	PC*	5	3	0	2	4
<b>PRACTICALS</b>								
7	20CS4L1	<a href="#">Database Management Systems Laboratory</a>	PC*	4	0	0	4	2
8	20HS4L2	<a href="#">Professional Communication Laboratory</a>	EEC*	2	0	0	2	1
<b>TOTAL</b>				<b>26</b>	<b>17</b>	<b>1</b>	<b>8</b>	<b>22</b>

\* Common to B.E CSE & B.Tech IT Programmes

## SEMESTER V

SL NO	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
<b>THEORY</b>								
1	20CS501	<a href="#">Computer Networks</a>	PC*	3	3	0	0	3
2	20CS502	<a href="#">Software Engineering</a>	PC*	3	3	0	0	3
3	20EC506	<a href="#">Microcontrollers and Embedded Systems</a>	PC*	3	3	0	0	3
4	20EC304	<a href="#">Analog and Digital Communication</a>	ES*	3	3	0	0	3
5		<a href="#">Open Elective – I</a>	OE	3	3	0	0	3
6	20MC501	<a href="#">Constitution of India</a>	MC	1	1	0	0	0
<b>THEORY CUM PRACTICAL</b>								
7	20IT501	<a href="#">Web Programming</a>	PC	5	3	0	2	4
<b>PRACTICALS</b>								
8	20CS5L1	<a href="#">Networks laboratory</a>	PC*	4	0	0	4	2
9	20CS5L2	<a href="#">Software Engineering Laboratory</a>	PC*	4	0	0	4	2
10	20EC5L3	<a href="#">Microcontrollers and Embedded Systems Laboratory</a>	PC*	4	0	0	4	2
<b>TOTAL</b>				33	19	0	14	25

\* Common to B.E CSE Programme & B.Tech IT Programme

# Common to B.E CSE, B.E. ECE Programme & B.Tech IT Programme



## SEMESTER VI

SL NO	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
<b>THEORY</b>								
1	20IT601	<a href="#">Internet of Things</a>	PC	3	3	0	0	3
2	20IT602	<a href="#">Mobile Communication</a>	PC	3	3	0	0	3
3	20HS602	<a href="#">Principles of Management</a>	HS	3	3	0	0	3
4		<a href="#">Professional Elective - I</a>	PE	3	3	0	0	3
5	20MC601	<a href="#">Essence of Indian Traditional Knowledge</a>	MC	1	1	0	0	0
<b>THEORY CUM PRACTICAL</b>								
5	20CS604	<a href="#">Machine Learning</a>	PC#	5	3	0	2	4
<b>PRACTICALS</b>								
6	20IT6L1	<a href="#">Internet of Things Laboratory</a>	PC	4	0	0	4	2
7	20CS6L1	<a href="#">Mobile Application Development Laboratory</a>	PC*	4	0	0	4	2
<b>TOTAL</b>				<b>26</b>	<b>16</b>	<b>0</b>	<b>10</b>	<b>20</b>

\* Common to B.E CSE Programme &amp; B.Tech IT Programme

# Common to B.E CSE, B.E. ECE Programme &amp; B.Tech IT Programme

**PROFESSIONAL ELECTIVE – I (VI SEMESTER)**

SL NO	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
1	20EE503	<a href="#">Digital Signal Processing</a>	PE	3	3	0	0	3
2	20CS6A1	<a href="#">Data Warehousing and Data Mining</a>	PE*	3	3	0	0	3
3	20IT6A1	<a href="#">Information Theory and Coding</a>	PE	3	3	0	0	3
4	20IT6A2	<a href="#">Software Testing</a>	PE*	3	3	0	0	3
5	20IT6A3	<a href="#">Information Storage Management</a>	PE	3	3	0	0	3
6	20IT6A4	<a href="#">Real Time Systems</a>	PE*	3	3	0	0	3
7	20HS6A3	<a href="#">Entrepreneurship technopreneurship development</a>	PE	3	3	0	0	3

\* Common to B.E CSE &amp; B.Tech IT Programme

**OPEN ELECTIVE – I (V SEMESTER) offered by IT Department**

Sl. No.	COURSE CODE	COURSE TITLE	Category	Contact Periods	L	T	P	C
<b>THEORY</b>								
1	20OE501	<a href="#">Principles of Software Testing</a>	OE	3	3	0	0	3
2	20OE502	<a href="#">Fundamental of Web Technology</a>	OE	3	3	0	0	3
3	20OE503	<a href="#">Internet of Things and its Applications</a>	OE	3	3	0	0	3
4	20OE504	<a href="#">Cyber security</a>	OE	3	3	0	0	3

20HS101	ENGLISH FOR TECHNICAL COMMUNICATION	L	T	P	C
		3	0	0	3

**OBJECTIVES:**

- This course is designed for entry level Engineering and Technology curriculum enabling the students to learn, acquire and apply for their learning and career.
- The course is aimed at providing effective skills for promoting communication skills through English.
- Students will benefit in conversing with the peers, faculty and fellow professionals.
- The outcome of this course contains refined level of English proficiency by acquiring all four skills, listening, speaking, reading and writing to prepare them for global readiness.

**PRE-REQUISITE: NIL**

**UNIT-I FOCUSING LANGUAGE DEVELOPMENT 9**

**Listening:** Listening to TV News, Guest Lecturers, Note – taking. **Speaking:** Pronunciation Common Vocabulary – Technical Vocabulary – Answering Peer Questions – Conversation with Teacher. **Reading:** News magazines, Reading for unfamiliar words, Variety of News Items

**Writing:** Word formation – Auxiliary verbs – Modal Verbs – Sentence Types – Affirmative, Negative, Interrogative, Concord – Dialogue Writing, Letter to Principal / Director – Instructions using Auxiliary

**UNIT-II GRAMMAR AND TECHNICAL READING 9**

**Listening:** Listening to Peer Conversations – Brief Speeches – Listening for Specific Information – Recap of Speeches. **Speaking:** Wh Questions, Day today conversations, Telephonic enquiries official/formal enquiries. **Reading:** Technical Essays – Identifying Sentence Types – Classifying the verb patterns. **Writing:** Tenses – Simple Present, Present Progressive, Present Perfect, Present Perfect Continuous – Voice – Active & Passive – Précis Writing – Essay Writing

**UNIT - III GRAMMAR AND LANGUAGE DEVELOPMENT 9**

**Listening:** TV interviews, Commentaries, Digital Videos for World Information. **Speaking:** Telephonic Conversation – Classroom Activities – Conversing Information. **Reading:** Coherence, Development of Thoughts. **Writing:** Tenses – Simple Past, Past Progressive, Past Perfect, Past perfect continuous – Impersonal Passive-Narrating the past events, Letter to friend/father about Industrial Visit/Functions held – Narrating the past experience using Impersonal Passive voice

**UNIT - IV READING AND LANGUAGE DEVELOPMENT 9**

**Listening:** Listening to Dialects of English – British & American Regional. **Speaking:** Role Plays, Extempore, Responding to specific questions. **Reading:** Comprehensive passages, Reading for specific points. **Writing:** Tenses – Simple Future, Future progressive, Future Perfect, Future Perfect continuous – Definition – Phrases of Reason – Cause & Effect, Recommendations, Argumentative Essays, Letter to the Editor on Social Issues – Analytical

Essays on Social hazards using Cause and Effect.

**UNIT - V EXTENDED WRITING**

**9**

**Listening:** Listening to Technical Seminar speeches – Listening to achievers, eminent personalities – Dialects – Australian – African – Asian. **Speaking:** Welcome address, Compeering, Vote of Thanks, Peer debates. **Reading:** Texts on self-confidence, motivation, success path. **Writing:** Contracted forms, Conditionals, Articles, Preposition, Tense – ‘going to’ - Error Spotting, Sequence Words – Rearranging – Writing a Book Review – Summary writing – Rearranging Sentences using Sequence Words, Note Making

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Listen, Comprehend and Correspond with others at various contexts
- Speak legibly and fluently under various life-time situations by applying proper communication modules.
- Read and understand a variety of writings and technical text by analyzing the meaning and language.
- Apply clear and legible writing skills in error free style in coherent manner
- Remember and use various communicative skills in precise and efficient way on technological contexts
- Form situational conversations and technical writing styles for interpersonal and effective communication

**TEXT BOOKS:**

1. Board of Editors. “Using EnglishA Course book for Undergraduate Engineers and Technologists”. Orient Black Swan Limited, Hyderabad: 2015
2. Richards, C. Jack. “Interchange Students’ Book-2” New Delhi: CUP, 2015

**REFERENCES:**

1. Murphy, Raymond “English Grammar in Use with Answers: Reference and Practice for Intermediate Students”, Cambridge: CUP, 2004
2. Thomson, A.J. and Martinet, A.V. “A Practical English Grammar”, OUP, New Delhi: 1986  
Anne Laws, “Writing Skills”, Orient Black Swan, Hyderabad, 2011
3. Board of Editor, “English for Technical Communication”, Great Mind Publication, Chennai : 2018

<b>20BS101</b>	<b>FUNDAMENTALS OF ENGINEERING MATHEMATICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	1	0	4

**OBJECTIVES:**

- To relate various methods of Matrix Algebra to handle practical problems arising in the field of engineering.
- The main aim of this course is to achieve conceptual understanding and to retain the best traditions of Calculus.
- The syllabus is designed to provide the basic tools of Calculus of Single and Multivariable, mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions.

**PRE-REQUISITE: NIL**

**UNIT-I MATRICES 12**

Introduction to Matrices-Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley-Hamilton Theorem – Diagonalization of matrices – Reduction of a Quadratic form to Canonical form by Orthogonal transformation – Nature of Quadratic forms.

**UNIT - II DIFFERENTIAL CALCULUS 12**

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Differentiation of Polynomials, Exponential, Trigonometric, Hyperbolic, Logarithmic and Implicit functions- Maxima and Minima of functions of single variable.

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

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

**UNIT – IV INTEGRAL CALCULUS 12**

Definite and Indefinite integrals - Substitution rule - Techniques of integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions, Improper integrals.

**UNIT – V ORDINARY DIFFERENTIAL EQUATIONS 12**

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler’s and Legendre’s type – System of simultaneous linear differential equations with constant coefficients.

**TOTAL: 60 PERIODS**

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Find the Eigen values and Eigen vectors to diagonalize a matrix, reduce quadratic form to canonical form.
- Apply the concept of limits, continuity and rules of differentiation to differentiate some

standard functions and apply the techniques of differentiation to differentiate various types of functions.

- Understand the concepts of Concavity and Convexity by finding the Critical points, point of Inflection and to find Maxima and Minima functions of Single variable.
- Find the derivatives of functions of two variables and apply them to calculate the maxima and minima.
- Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.
- Apply various techniques to solve higher order differential equations with constant and variable coefficients.

**TEXT BOOKS:**

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2017.
2. T. Veerarajan., "Engineering Mathematics", The Tata Mc Graw Hill Publication-New Delhi, First Edition, 2018

**REFERENCES:**

1. James Stewart, "Calculus, Early Transcendental", Cengage Learning, 7th Edition, New Delhi, 2015. [For units II & III].
2. Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 9th Edition, New Delhi, 2006.
3. Wiley, "Calculus- International Student version", 10<sup>th</sup> Edition, Wiley India Pvt. Ltd, New Delhi 2017.
4. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5<sup>th</sup> Edition, 2016.
5. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 9th Edition, 2014.

**OBJECTIVES:**

- To inculcate the fundamental knowledge in properties of matter and crystal physics.
- To enrich the knowledge on Laser, fiber optics and ultrasonics and their applications relevant to various streams of Engineering and Technology.
- To introduce quantum physics and its applications

**PRE-REQUISITE: NIL**

**UNIT - I      PROPERTIES OF MATTER      9**

Elasticity – Hooke’s Law – Stress-strain diagram and its uses – Three modulus of elasticity (qualitative) – Poisson’s ratio – factors affecting elastic modulus and tensile strength – twisting couple – torsional pendulum: theory and experiment – bending of beams – bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment – I-shaped girders.

**UNIT - II      LASER AND FIBER OPTICS      9**

Lasers: Interaction of radiation with atomic energy states – Einstein’s A and B coefficients derivation – Population inversion – resonant cavity, optical amplification (qualitative) – solid state lasers – Nd:YAG laser, Semiconductor lasers: homojunction and heterojunction – Fiber optics: principle, numerical aperture and acceptance angle – types of optical fibers (material, refractive index, mode) – losses associated with optical fibers – fiber optic sensors: pressure and displacement sensor.

**UNIT - III      ULTRASONICS      9**

Ultrasonics – classification (qualitative) – properties – generation – magnetostriction and piezoelectric methods – detection of ultrasound – cavitations – velocity measurement – acoustic grating – Industrial applications (Drilling, Welding, Soldering and Cleaning) – SONAR – NDT – Pulse Echo system through Transmission and Reflection modes – A, B and C scan displays - Medical application – sonogram.

**UNIT - IV      QUANTUM PHYSICS      9**

Black body radiation – Planck’s theory (derivation) – Compton effect: theory and experimental verification – wave particle duality – wave function and its physical significance – Schrödinger’s wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – tunneling (qualitative) – scanning tunneling microscope.

**UNIT - V      CRYSTAL PHYSICS      9**

Crystalline and amorphous materials – unit cell, crystal systems, Bravais lattices, lattice planes - Miller indices – Inter planar spacing in cubic lattice – coordination number and packing factor for SC, BCC, FCC, HCP structures – growth of single crystals: solution and melt growth techniques – Mechanisms of plastic deformation, slip and twinning.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Demonstrate the properties of elasticity and measure the different moduli of elasticity.
- Examine the characteristics of laser and optical fiber
- Apply the concepts of ultrasonics in engineering
- Explain black body radiation, properties of matter waves and Schrodinger equation
- Classify the Bravais lattices and different types of crystal structures
- Gain information on growth of crystals and deformations

**TEXT BOOKS:**

1. R. K. Gaur and S. L. Gupta, "Engineering Physics", Dhanpat Rai Publications, 2012.
2. B. K. Pandey and S. Chaturvedi, "Engineering Physics", Cengage Learning India, 2018.
3. V.Rajendran, "Engineering Physics", Tata McGraw Hill Education Private Limited, 2011.

**REFERENCES:**

1. D.Halliday, R. Resnick and J. Walker, "Principles of Physics", Wiley publisher, 10<sup>th</sup> Edition, 2015.
2. R.A.Serway and J.W. Jewett, "Physics for Scientists and Engineers", Cengage Learning, 2014.
3. P.A.Tipler and G. Mosca, "Physics for Scientists and Engineers with Modern Physics", W.H.Freeman, 2007.
4. D.K.Bhattacharya and T. Poonam, "Engineering Physics", Oxford University Press, 2017.

20BS103

ENGINEERING CHEMISTRY

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To make the students, familiar with boiler feed water requirements, related problems and water treatment techniques.
- To learn the principle of electrochemical cell, types of corrosion and its control.
- To develop an understanding of the basic concepts of phase rule and its applications to one and two component systems and appreciate the purpose and significance of alloys.
- To be familiar with different types of fuel and their characteristics and also functioning of energy storage devices.
- To understand the techniques of spectra and chromatography for analytical purpose.

**PRE-REQUISITE: NIL**

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

Characteristics of water; Hard water, Soft water, difference; Hardness – types of hardness, expression of hardness, units, removal of hardness (boiling, soda lime process), estimation of hardness of water by EDTA method (problems); Boiler feed water – requirements – disadvantages of using hard water in boilers (scale and sludge, priming and foaming, caustic embrittlement, boiler corrosion); Treatment of boiler feed water – internal treatment (carbonate, phosphate, and calgon conditioning) external treatment – ion exchange process, zeolite process; Purification of water- reverse osmosis, electro dialysis, Application of nanomaterials in water purification.

**UNIT - II ELECTROCHEMISTRY AND CORROSION 9**

Electrochemical cell - redox reaction, electrode potential- origin of electrode potential- oxidation potential- reduction potential, - electrochemical series and its significance - Nernst equation (derivation and problems).  
Corrosion- causes- factors, electrochemical corrosion (galvanic, differential aeration), corrosion control - material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method – corrosion inhibitors. Metallic coating – Electroplating – Factors - Electroplating of Copper and Electroless plating of Nickel.

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

Phase rule - introduction, definition of terms with examples; One component system - water system; Reduced phase rule - two component system, classification, lead-silver system; Alloys – introduction, definition, properties of alloys, significance of alloying; Functions and effects of alloying elements; Heat treatment of steel - annealing, hardening, tempering, carburizing, nitriding; Ferrous alloys- nichrome and stainless steel (18/8); Non-ferrous alloys – brass and bronze.

**UNIT - IV FUELS AND BATTERIES 9**

Fuels – classification, characteristics; Petrol – characteristics, knocking, octane number; Diesel – characteristics, cetane number; Natural gas (CNG), LPG, Power alcohol, Biodiesel, Gasohol; Combustion of fuels – calorific value, GCV and NCV (Problems), calculation of theoretical air for combustion (Problems), Ignition temperature, explosive range, flue gas analysis (Orsat apparatus);



Batteries – primary and secondary batteries, lead-acid battery, lithium ion battery, Fuel cell (hydrogen oxygen fuel cell).

**UNIT - V ANALYTICAL TECHNIQUES****9**

Spectroscopic techniques – UV-visible(Principle and Instrumentation – Block Diagram only and applications), IR(Principle and Instrumentation – Block Diagram only and applications), <sup>1</sup>H NMR ((Principle and Instrumentation – Block Diagram only) – Chromatography – HPLC - Flame photometry – Estimation of sodium by Flame photometry.

**TOTAL: 45 PERIODS****OUTCOMES:****AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Identify the problems of hardness of water in boilers and to treat water by various methods.
- Construct electrochemical cell and apply Nernst equation for an electrochemical cell and identify various methods to control corrosion.
- Analyse the phase diagram of one component and two component system and describe the various methods of heat treatment of steel.
- Categorise the various types of fuels by their characteristics and analyse the flue gas by Orsat's method.
- Illustrate the working of lead acid battery, lithium ion battery and fuel cell.
- Describe the instrumentation and working of UV, IR, <sup>1</sup>H NMR, HPLC, and flame photometry.

**TEXT BOOKS:**

1. P.C. Jain and Monika Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2017
2. S.S Dara and S.S Umare, "A Text Book of Engineering Chemistry", S.Chand & Company Limited, 20th Edition, 2018

**REFERENCES:**

1. Shashi Chawla, "A Textbook of Engineering Chemistry", Dhanpat Rai & CO. (PVT) LTD, New Delhi, 2012.
2. B.R. Puri, L.R. Sharma, M.S. Pathania, Vishal, "Principles of Physical Chemistry", Vishal Publishing Co., Punjab, 47th Edition, 2017.
3. G Palanna, "Engineering Chemistry", McGraw Hill Education (India) PVT, LTD, Chennai, 2017.
4. Dr. Sunita Rattan, "A Textbook of Engineering Chemistry", S.K.Kataria & Sons, New Delhi, 2012

<b>20GE101</b>	<b>PROBLEM SOLVING USING PYTHON PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	0	0	3

**OBJECTIVES:**

- To know the basics of Computers and algorithmic problem solving
- To understand Python programs with conditional and looping constructs.
- To define Python functions and strings.
- To use Python data structures – lists, tuples, sets and dictionaries.
- To do input/output with files in Python.

**PRE-REQUISITE: NIL**

**UNIT-I COMPUTER FUNDAMENTALS AND PROBLEM SOLVING 9**

Introduction to Computer System – Block Diagram of Computer, Types of Memory, I/O Devices, Application Programs, System Programs – Loader, linker, assembler, compiler, interpreter, Programming process – source code to executable code, Problem Solving Strategies – Problem analysis, Algorithms, Flow Charts, Pseudo Code. Illustrative problems: odd or even number, Leap year, Biggest of three numbers, square root of a number, Sum of n numbers, Armstrong number, Palindrome, Fibonacci Series, Prime number, Bubble Sort and Linear Search.

**UNIT-II DATA, EXPRESSIONS, CONTROL FLOW STATEMENTS 9**

Python interpreter and interactive mode, values and types – int, float, boolean, string, and list, variables, expressions, statements, tuple assignment, operators and precedence of operators, comments, Control Flow Statements – Conditionals – conditional (if), alternative (if-else), chained conditional (if-elif-else), Iteration – state, while, for, break, continue, pass, Illustrative programs – exchange the values with and without using temporary variables, circulate the values of n variables, distance between two points.

**UNIT - III FUNCTIONS, STRINGS 9**

Functions – function definition and use, flow of execution, parameters and arguments, function composition, Fruitful functions – return values, parameters, local and global scope, recursion, Strings – string slices, immutability, string functions and methods, string module, Illustrative programs – square root, GCD, exponentiation, Factorial of a number, linear search, binary search.

**UNIT - IV LISTS, TUPLES, SETS, DICTIONARIES 9**

Lists – list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters, Lists as arrays, Tuples – tuple assignment, tuple as return value, Sets - Creating a set, Modifying a set, Removing elements from a set, Set operations- Set Union, Set intersection, Set difference, Set membership test, Iterating through a set, Set methods, Built-in functions with set, Frozenset - Dictionaries – operations and methods, Advanced list processing –List comprehension, Illustrative programs – selection sort, insertion sort, Matrix addition and subtraction, sum an array of numbers.

**UNIT - V FILES, MODULES, PACKAGES**

9

Files and exception – text files, reading and writing files, format operator, command line arguments, errors and exceptions, handling exceptions, modules, packages – Math and Rand, Illustrative programs – word count, copy file, merge two files.

**TOTAL: 45 PERIODS****OUTCOMES:****AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Explain Components of a Computer System, types of programming languages, types of software with examples and purpose.
- Perform problem analysis, use algorithms and prepare flow charts, pseudo code for solving simple problems.
- Use Conditional, iteration constructs of python programming and apply to solve simple problems.
- Use Functions, recursive function, String functions in python programming and apply to perform linear and binary search.
- Explain the various operations for manipulating Tuples, Sets, Dictionaries and Use List to perform simple and sorting operations.
- Explain file handling operations, exception handling, modules and packages and illustrate programs for word count, file copy, merge operations and exception handling.

**TEXT BOOKS:**

1. E. Balagurusamy, “Problem solving and Python Programming”, First edition, McGraw Hill Education (India) Private Limited, 2017.
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016 (<http://greenteapress.com/wp/think-python/>)

**REFERENCES:**

1. Yashavant Kanetkar, Aditya Kanetkar, “Let Us Python”, 2<sup>nd</sup> Edition, BPB Publications, 2020.
2. John V Guttag, Introduction to Computation and Programming Using Python: With Application to Understanding Data, 2<sup>nd</sup> Edition, PHI Publisher, 2017.
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
4. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd., 2015.
5. Paul Gries, Jennifer Campbell and Jason Montojo, Practical Programming: An Introduction to Computer Science using Python 3.6, 3<sup>rd</sup> edition, Shroff/O’ Reilly Publishers, 2018.
6. Dr.A.Kannan, Dr.L.SaiRamesh, Problem Solving and Python Programming, Updated
7. Edition, United Global Publishers Pvt. Ltd., April 2018.

**OBJECTIVES:**

To introduce different experiments to test basic understanding of physics concepts applied in Optics, properties of matter and liquids.

**PRE-REQUISITE: NIL****LIST OF EXPERIMENTS****(Any five to be carried out & one demonstration experiment)**

1. Determination of Rigidity modulus – Torsional Pendulum.
  2. Determination of Young’s modulus – Non Uniform Bending.
  3. a. Determination of wavelength and particle size using diode laser.  
b. Determination of acceptance angle in an optical fiber.
  4. Determination of velocity of sound and compressibility of liquid using ultrasonic interferometer.
  5. Determination of band gap of a semiconductor diode.
  6. Determination of thickness of a thin wire – Air wedge method.
  7. Determination of dispersive power of a prism – Spectrometer\*
  8. Determination of wavelength of mercury spectrum – Spectrometer grating
- \*Demonstration experiment

**OUTCOMES:****AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Evaluate moment of inertia of a disc and rigidity modulus for thin wire using Torsional pendulum
- Appraise Young’s modulus of material of the given beam by Non-Uniform bending method
- Measure the wavelength of laser light, Particle size and basic parameter of optical fiber using Semiconductor diode LASER
- Estimate velocity of ultrasound and compressibility of liquid
- Estimate the wavelength of the prominent spectral lines
- Utilize experiment kits for useful applications

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS**

S.No.	NAME OF THE EQUIPMENT	Qty.
1	Torsional pendulum set	6
2	Travelling microscope & accessories	6
3	Laser kit	6
4	Ultrasonic interferometer	6
5	Semiconductor band gap kit	6
6	Air wedge set up	6
7	Spectrometer & prism	6
8	Spectrometer & Grating	6

**CHEMISTRY LABORATORY**

**OBJECTIVES:**

- To make the students to acquire practical skill in the determination of water quality parameters through volumetric analysis.
- To have hands on experience in using instruments like pH meter, conductivity meter, potentiometer.
- To acquaint the students with the determination of molecular weight of polymer by viscometer.

**PRE-REQUISITE: NIL**

**Any Five experiments to be given**

1. Determination of total, temporary & permanent hardness of water by EDTA method.
2. Determination of alkalinity in water sample.
3. Determination of dissolved oxygen content of water sample by Winkler's method.
4. Determination of strength of given hydrochloric acid using pH meter.
5. Estimation of iron content of the given solution using potentiometer.
6. Conductometric titration of a strong acid Vs a strong base.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
9. Corrosion Experiment – Weight Loss Method.
10. Estimation of sodium present in water using flame photometer.

**TOTAL(Physics & Chemistry): 45 PERIODS**

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Estimate the Chemical quality parameter of a water sample.
- Estimate the strength of acid by conductometric and pH metric titration..
- Estimate the strength of oxidisable material present in given sample by potentiometry.
- Determine the molecular weight of polymer by Ostwald viscometer.
- Demonstrate the rate of corrosion by weight loss method.

**REFERENCE:**

1. Vogel's "Text book of quantitative chemical analysis" (8<sup>th</sup> edition, 2014)

**LIST OF APPARATUS AND EQUIPMENT FOR A BATCH OF 30 STUDENTS**

<b>S.No.</b>	<b>NAME OF THE EQUIPMENT</b>	<b>Qty.</b>
1	Burette	30
2	Pipette	30
3	Beaker (100ml)	30
4	Conical Flask (250ml)	30
5	Conductivity meter	10
6	Potentiometer	10
7	pH meter	10
8	Viscometer	10
9	Flame Photometer	1
10	Electronic Balance	1

**OBJECTIVES:**

- To write, test, and debug simple Python programs using conditional statements.
- To implement Python programs using loops.
- To use functions for structuring Python programs.
- To implement Python programs using lists.
- To write Python programs for implementing file operations

**PRE-REQUISITE: NIL****LIST OF PROGRAMS**

1. Biggest of three numbers, odd or even number, Leap year.
2. GCD, Armstrong Number, Palindrome, Fibonacci Series, Prime number
3. Find the square root and exponentiation of a number with and without built-in functions
4. Linear search and Binary search using Recursion.
5. Find the maximum of a list of numbers
6. Selection sort, Insertion sort
7. First n prime numbers
8. Transpose of a Matrix
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Merge two files

**PLATFORM NEEDED:** Python 3 interpreter for Windows/Linux

**TOTAL: 60 PERIODS**

**OUTCOMES:****AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Develop simple Python programs using conditional and iterative constructs.
- Develop simple Python programs using built-in functions and user-defined functions.
- Develop a Python program using recursion to implement linear and binary search.
- Develop a Python program using list to implement selection and insertion sort.
- Develop Python programs to implement matrix operations.
- Develop a Python program to implement file handling.

<b>20GE1L2</b>	<b>INDUSTRIAL PRACTICES WORKSHOP</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		0	0	3	1.5

**OBJECTIVES:**

- To provide exposure to the students with Hands On Experience on various Basic Industrial Practices in Civil, Mechanical, Electrical and Electronics Engineering.

**PRE-REQUISITE: NIL**

**GROUP A (CIVIL & MECHANICAL)  
LIST OF EXPERIMENTS**

**I CIVIL ENGINEERING PRACTICE**

**UNIT-I CARPENTRY PRACTICE**

1. Study of carpentry tools.
2. Preparation of Cross lap joint
3. Preparation of Dovetail joint
4. Preparation of T joint

**UNIT-II PLUMBING PRACTICE**

1. Study of plumbing tools, pipeline joints, its location and functions: valves, taps, couplings, unions, reducers and elbows in household fittings.
2. Exercise on Preparation of plumbing line sketches for water supply and sewage works.
3. Exercise on providing of basic water line connection for a residential house using plumbing components.
4. Exercise on providing Water line pipe connections for household utilities like water heater, wash basin etc.,

**II MECHANICAL ENGINEERING PRACTICE**

**UNIT - III SHEET METAL PRACTICE**

1. Study of sheet metal forming tools.
2. Preparation of a Model of rectangular tray.
3. Preparation of a Model of Conical Funnel.

**UNIT - IV MACHINING PRACTICE**

1. Study of machining tools.
2. Exercise on Simple turning, Facing, Chamfering
3. Exercise on Taper turning.
4. Exercise on Drilling and Tapping.

**UNIT – V METAL JOINING PROCESS**

1. Study of welding tools.
2. Exercise to join two metal plates by single butt joint using arc welding.
3. Exercise to join two metal plates by T Fillet joint using arc welding.
4. Exercise to join two metal plates by lap joint using arc welding.



**DEMONSTRATION**

1. Gas welding process.
2. Refrigeration and Air conditioning process.

**GROUP B (ELECTRICAL & ELECTRONICS)  
LIST OF EXPERIMENTS**

**I ELECTRICAL ENGINEERING PRACTICE**

1. Residential house wiring using switches, fuse, indicator, Fluorescent lamp and Energy Meter.
2. Measurement of Power consumption for CFL, Fluorescent Lamp, LED Lamp and Incandescent lamp.
3. Stair case wiring
4. Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of an electrical equipment.

**II ELECTRONICS ENGINEERING PRACTICE**

1. Study of Electronic components – Resistor colour coding, Capacitor, Inductor Measurement using LCR meter, Transistor & Diode – Terminal identification using Multimeter.
2. Study of logic gates AND, OR, EX-OR and NOT.
3. Measurement of AC signal parameter (peak-peak, rms value, period & frequency) using CRO and AFO.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

**TOTAL: 45 PERIODS**

<b>LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS</b>		
<b>CIVIL</b>		
<b>S. No</b>	<b>Component Name</b>	<b>No. of Components</b>
1	Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, coupling, unions, elbows, plugs and other fittings	15 sets
2	Carpentry Vice (fitted to work bench)	15 nos
3	Standard wood working tools	15 sets
4	Models of industrial trusses, door joints, furniture joints	5 each

5	Power Tools a. Rotary Hammer b. Demolition Hammer c. Circular Saw d. Planer e. Hand Drilling Machine f. Jigsaw	2 nos 2 nos 2 nos 2 nos 2 nos 2 nos
<b>MECHANICAL</b>		
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 brush, etc.	5 sets
4	Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 nos
5	Centre Lathe	2 nos
6	Power Tool: Angle Grinder	2 nos
7	Study purpose items: Refrigerator and Air Conditioner	One each
<b>ELECTRICAL</b>		
1	Assorted electrical components for house wiring	10 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 b. Digital Live-wire detector	2 nos 2 nos
<b>ELECTRONICS</b>		
1	Soldering guns	10 nos
2	Assorted electronic components for making circuits	50 nos
3	Small PCBs	10 nos
4	Multimeters	10 nos
5	Regulated of power supply, CRO	1 no. each

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Prepare different carpentry joints.
- Prepare pipe connections with different joints for domestic applications.
- Make the models using sheet metal works.
- Carry out the basic machining operations.
- Prepare joints using welding equipment's.
- Demonstrate on gas welding, refrigeration and air conditioning processes.
- Carry out basic home electrical works and appliances.
- Measure the electrical quantities.
- Elaborate on the components, gates, soldering practices.

<b>20HS201</b>	<b>ADVANCED TECHNICAL COMMUNICATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	0	0	3

**OBJECTIVES:**

- This course is designed for Engineering and Technology curriculum enabling the students to learn, acquire and apply updated elements of English communication.
- The course is aimed at providing effective skills for procuring communication skills for business and advanced technology.
- Students will benefit by learning the four skills – Listening, Speaking, Reading and Writing – to meet the global requirements for their career and higher studies.

**PRE-REQUISITE: NIL**

**UNIT-I TECHNICAL WRITING 9**

**Listening:** Listening to audio-visuals on personal Interviews, Speeches from Company CEOs, TV Debates. **Speaking:** Wishing, Greeting, Enquiring Hobbies. **Reading:** Editorials, Letter to the Editor Columns, Technical Papers. **Writing:** Analytical writings, Emphasis Techniques, Letter Writing – Business Correspondence, Abstract Writing, Common Errors, Footnotes, Compound words, Preparation of Agenda

**UNIT-II BUSINESS ENGLISH AND LANGUAGE DEVELOPMENT 9**

**Listening:** Listening to Audio-Visual documentary, TV Programs of Celebrities Forum. **Speaking:** Self-Expression, Introducing the fellow students, Talking about celebrities, leaders  
**Reading:** Company Correspondence, Business Correspondence, Technical Text for Vocabulary  
**Writing:** Bibliography, Sentence Completion, Cloze exercises, Verbal Analogy, Letter – Business enquiry orders, payments, Minutes Preparation.

**UNIT - III VISUAL BASED LANGUAGE DEVELOPMENT 9**

**Listening:** Visuals on Group Discussion-Understanding the nuances of GD – Approach – Content – Methodology. **Speaking:** Discussing main points on burning issues, Social issues – Expressing ideas and suggestions. **Reading:** Etiquettes of Non-Verbal Communication. **Writing:** List of common expressions for specified situations – Sentence linkers – Formal Expressions – Suggestions – Reported Speech - Letter to the Editor on Common Issues – Writing the Points in Indirect Form – Check Lists – Numerical Expressions

**UNIT - IV EMPLOYABILITY CORRESPONDENCE 9**

**Listening:** Listening to Visuals of Technical Paper presentation – Technical and HR interviews  
**Speaking:** Peer-to-Peer Interview – Mock Interview – Telephone Conversations. **Reading:** Comparative Analyses – Instructions on Public Spots – Time Management concepts – Email Correspondence. **Writing:** Compare and Contrast – Cause and Effect – Purpose and Function – Job Application Letter – Drafting Resume / CV, – Inferring the graphical / Pictorial representations – Bar chart – Pie chart, Instruction – common and technical instructions for a process or a component.

**UNIT - V TECHNICAL REPORT WRITING****9**

**Listening:** Key note speeches – Annual Reports of institutions / companies. **Speaking:** Answering to the Mock Panel Interview – Sharing of interview experiences – presenting a Technical Paper. **Reading:** Annual Reports – Company Reports – Newspaper reports – Comprehension passages. **Writing:** Homophones – Abbreviations and Acronyms – SI Units – Report Writing with recommendations – Inferring the Graph – Flow Chart – Tables – Technical Papers

**TOTAL: 45 PERIODS****OUTCOMES:****AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Listen, Understand and create technical correspondence at advanced level
- Respond or answer to the contextual questions, interview questions, form instructions, draft reports
- Speak and analyze social issues, come out with effective ideas for discussion, understand the passages for meaning and vocabulary
- Assess error free technical writings, create legible and coherent technical papers, derive ideas of the given texts in a precise form
- Remember the updated elements of communication skills, nuances of non-verbal communication, business communication
- Create technical instructions, process instructions, self-appraisals, Resumes, reports on various situations

**TEXT BOOKS:**

1. Board of editors. "Fluency in English A Course book for Engineering and Technology". Orient Blackswan, Hyderabad: 2016
2. Raman, Meenakshi and Sharma, Sangeetha "Technical Communication Principles and Practice". Oxford University Press: New Delhi, 2014.

**REFERENCES:**

1. Booth-L. Diana, "Project Work", Oxford University Press, Oxford: 2014
2. Grussendorf, Marion, "English for Presentations", Oxford University Press, Oxford: 2007
3. Means, L. Thomas and Elaine Langlois, "English & Communication For Colleges". Cengage Learning, USA: 2007
4. Board of Editor, "Advanced Technical Communication", Great Mind Publication, Chennai : 2019

<b>20BS201</b>	<b>LAPLACE TRANSFORM AND ADVANCED CALCULUS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	1	0	4

**OBJECTIVES:**

- To make the student familiar with topics such as Multiple Integrals, Vector Calculus, Analytic Functions, Complex Integration and Laplace Transform.
- To learn the concept of basic Vector Calculus which can be widely used for Modeling the various laws of Physics.
- To understand the various methods of Complex Analysis and Laplace Transform can be used for efficiently solving the problems that occur in various branches of Engineering disciplines.

**PRE-REQUISITE: NIL**

**UNIT - I LAPLACE TRANSFORM 12**

Existence Conditions – Transforms of Elementary Functions – Transform of Unit Step Function and Unit Impulse Function – Basic Properties – Shifting Theorems -Transforms of Derivatives and Integrals – Initial and Final Value Theorems – Inverse Transforms – Convolution Theorem – Transform of Periodic Functions – Application to Solution of Linear Second Order Ordinary Differential Equations with Constant Coefficients.

**UNIT-II MULTIPLE INTEGRALS 12**

Double integrals – Change of order of integration – Double integrals in Polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of Solids – Change of Variables in Double and Triple integrals.

**UNIT-III VECTOR CALCULUS 12**

Gradient and Directional Derivative – Divergence and Curl - Vector Identities – Irrotational and Solenoidal Vector fields – Line Integral over a Plane curve – Surface Integral - Area of a Curved Surface - Volume Integral – Green’s, Gauss divergence and Stoke’s theorems – Verification and Application in evaluating Line, Surface and Volume Integrals.

**UNIT - IV ANALYTIC FUNCTIONS 12**

Analytic functions – Necessary and Sufficient Conditions for Analyticity in Cartesian and Polar Coordinates – Properties – Harmonic Conjugates – Construction of Analytic Function – Conformal Mapping – Mapping by Functions  $w = z+c$ ,  $cz$ ,  $1/z$ ,  $z^2$  -Bilinear transformation.

**UNIT - V COMPLEX INTEGRATION 12**

Line integral – Cauchy’s Integral Theorem – Cauchy’s Integral Formula – Taylor’s and Laurent’s Series – Singularities – Residues – Residue Theorem – Application of Residue Theorem for Evaluation of Real Integrals – Use of Circular Contour.

**TOTAL: 60 PERIODS**

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Understand the properties of Laplace transforms and to find the Laplace transform of some standard functions.
- Apply Laplace transform and inverse transform to solve the initial value problems.
- Solve the multiple integrals and apply the concept to find areas, volumes.
- Evaluation of line, surface and volume integrals using Green's, Gauss and Stokes theorems.
- Determine Analytic functions, Bilinear Transformations and apply the concept of conformal mapping to find the images of given curves.
- Evaluation of Contour Integrals using Cauchy's Integral and Residue theorems.

**TEXT BOOKS:**

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2017.
2. T. Veerarajan., "Engineering Mathematics I", The Tata Mc Graw Hill Publication-New Delhi, FirstEdition2018.

**REFERENCES:**

1. Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 9<sup>th</sup>Edition, NewDelhi, 2006.
2. James Stewart, "Calculus, Early Transcendental", Cengage Learning, 7th Edition, New Delhi, 2015.
3. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics II", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 9th Edition, 2014.
4. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics II", NarosaPublications, New Delhi, 5<sup>th</sup>Edition, 2016.
5. Sastry, S.S. "Engineering Mathematics", Vol.I& II, PHI Learning Pvt. Ltd, 4<sup>th</sup> Edition, New Delhi, 2014.

<b>20BS204</b>	<b>PHYSICS FOR INFORMATION SCIENCE</b>	<b>KLNCE UG IT R2020</b>			
		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To introduce the essential principles of semiconductor device and Electron transport properties.
- To inculcate proficiency in magnetic & optical properties of materials and their fruitful applications.
- To develop knowledge on Nano devices.

**PRE-REQUISITE: NIL**

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

Classical free electron theory – Derivation of electrical conductivity – Thermal conductivity – Wiedemann-Franz law – Success and failures – electrons in metals – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole.

**UNIT - II SEMICONDUCTOR PHYSICS 9**

Properties of semiconductor – Energy band diagram – direct and indirect band gap semiconductors – Intrinsic Semiconductors – Carrier concentration derivation – electrical conductivity, Energy band gap determination – variation of Fermi level with temperature – extrinsic semiconductors – Carrier concentration in N-type & P-type semiconductors (qualitative) – Variation of carrier concentration with temperature – variation of Fermi level with temperature and impurity concentration – Carrier transport in Semiconductor: random motion, drift, mobility and diffusion – Hall effect and devices.

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

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

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

Classification of optical materials – carrier generation and recombination processes – Absorption, emission and scattering of light in metals, insulators and semiconductors (concepts only) - photocurrent in a p-n diode – Photo voltaic effect – solar cell and its types – LCD – LED – Organic LED – Laser diodes – Optical data storage techniques.

**UNIT - V NANO DEVICES 9**

Quantum structures, Quantum confinement – Density of states in quantum well, quantum wire and quantum dot structure (qualitative) – Band gap of nanomaterials – Size dependence of fermi energy – Coulomb blockade effect –Quantum computation–Introduction– Single electron phenomena and Single Electron Transistor (SET) – Quantum dot laser – Carbon nanotubes: types, Properties and Applications.

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Differentiate classical, quantum electron theories and energy band theory
- Demonstrate the semiconductors and Hall effect devices
- Explain magnetic properties of materials
- Classify optical materials for Opto – electronic applications
- Clarify the basic operations of p-n junction devices like solar cell, LED etc
- Discuss different quantum structures, size effect and carbon nanotubes

**TEXT BOOKS:**

1. B.K.Pandey and S.Chaturvedi, "Engineering Physics", Cengage learning, 2013.
2. V.Rajendran, "Engineering Physics", Mc Graw-Hill Education, 2011
3. Charles Kittel, "Introduction to solid state Physics", John Wiley & sons, 8<sup>th</sup> edition, 2015.

**REFERENCES:**

1. G.W. Hanson, "Fundamentals of nano electronics", Pearson Education, 2009
2. B. Rogers, Adams and S. Pennathur, "Nanotechnology: Understanding Small Systems", CRC Press, 2019
3. N. Garcia and A. Damask, "Physics for Computer Science Students", Springer Verlag, 2012



20GE201

ENGINEERING GRAPHICS

L	T	P	C
2	0	2	3

**OBJECTIVES:**

- To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.
- To expose them to existing national standards related to technical drawings.

**PRE-REQUISITE: NIL**

**CONCEPTS AND CONVENTIONS (Not for Examination)**

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

**UNIT-I PROJECTION OF POINTS AND LINES 6+6**

Orthographic projection – Principles - Principal planes - Projection of points in all quadrants - Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method.

**UNIT-II PROJECTION OF PLANE SURFACES 6+6**

Projection of planes (Polygonal and Circular surfaces) inclined to both the principal planes by rotating object method.

**UNIT - III PROJECTION OF SOLIDS 6+6**

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method.

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

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

**UNIT - V ISOMETRIC PROJECTION AND FREEHAND SKETCHING 6+6**

Principles of Isometric Projection – Isometric scale – Isometric projections of simple solids - truncated Prisms and Pyramids.

Visualization concepts and Free Hand sketching : Principles – Representation of Three Dimensional objects – Layout of views - Freehand sketching of multiple views from pictorial views of objects

**TOTAL: 60 PERIODS**

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Familiarize with the fundamentals and standards of Engineering graphics.
- Draw the orthographic projections of points, lines and planes.
- Draw the projections of simple solids like prisms, pyramids, cylinder and cone.
- Draw the projections of sectional views of solids and develop its lateral surfaces.
- Draw the isometric projection of simple objects, truncated prism and pyramids.
- Draw the free hand sketching of simple objects.

**TEXT BOOKS:**

1. Natarajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 30<sup>th</sup> Edition, 2017.
2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 15<sup>th</sup> Edition, 2018.

**REFERENCES:**

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53<sup>rd</sup> Edition, 2019.
2. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education, 3<sup>rd</sup> Edition, 2012.

**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: Technical drawings - General principles of presentation.
4. IS 11669 – 1986: General principles of dimensioning on technical drawings.
5. SP 46 (2003): Engineering Drawing Practice for Colleges.
6. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

**SPECIAL POINTS APPLICABLE TO EXAMINATIONS ON ENGINEERING GRAPHICS:**

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

<b>20GE205</b>	<b>BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Qualitative Treatment only)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	0	0	3

**OBJECTIVES:**

- To learn the fundamental laws, theorems of electrical circuits and also to analyze them.
- To study the basic principles of electrical machines and their performances.
- To study the different energy sources and their utilizations.
- To study the fundamentals of electronic circuits.
- To understand the principles and operations of operational amplifiers.

**PRE-REQUISITE: NIL**

**UNIT - I ELECTRICAL CIRCUITS ANALYSIS 9**

Ohms Law, Kirchhoff's Law-Instantaneous power- series and parallel circuit analysis with resistive, capacitive and inductive network - nodal analysis, mesh analysis- network theorems - Thevenins theorem, Norton theorem, maximum power transfer theorem and superposition theorem, -star delta conversion.

**UNIT - II ELECTRICAL MACHINES 9**

DC and AC Rotating Machines: Types, Construction, principle, Emf and torque equation, Basics of Stepper Motor- Transformers-Introduction- types and construction, working principle of Ideal transformer-Emf equation- All day efficiency calculation.

**UNIT - III UTILIZATION OF ELECTRICAL POWER 9**

Renewable energy sources-wind and solar panels. Illumination by lamps- Sodium Vapour, Mercury vapour, Fluorescent tube. Domestic refrigerator -Electric circuit, construction and working principle. Protection-need for earthing. Energy Tariff calculation for domestic loads.

**UNIT - IV ELECTRONIC CIRCUITS 9**

Semiconductors, Types -PN Junction-VI Characteristics of Diode, zener diode, BJT- operations of PNP and NPN transistors- Transistors configurations –Common Base,Common Emitter &Common Collector configurations- Amplifiers.

**UNIT - V OPERATIONAL AMPLIFIERS AND DIGITAL ELECTRONICS 9**

Op amps- Amplifiers, oscillator, rectifiers, differentiator, integrator, ADC, DAC, Number Systems, Complements-1's and 2's Complements- Basic Digital Logic gates, Universal gates- NAND and NOR Implementation.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Discuss the essentials of electric circuits and analysis.
- Solve the various network theorems using different methodologies.
- Discuss the basic operation of electric machines and transformers.
- Understand the renewable sources and common domestic loads.

- Discuss the basics of semiconductor devices and applications.
- Explain about applications of Op-amps and basics of digital circuits.

**TEXT BOOKS:**

1. D.P. Kothari and I.J Nagarath, “Basic Electrical and Electronics Engineering”, Mc Graw Hill, 2019, Fourth Edition.
2. M.S. Sukhija and T.K. Nagsarkar, “Basic Electrical and Electronic Engineering”, Oxford, 2019.

**REFERENCES:**

1. S.B. Lal Seksena and Kaustuv Dasgupta, “Fundamentals of Electrical Engineering”, Cambridge, 2017
2. B.L Theraja, “Fundamentals of Electrical Engineering and Electronics”. Chand & Co, 2018.
3. S.K.Sahdev, “Basic of Electrical Engineering”, Pearson, 2019.
4. John Bird, “Electrical and Electronic Principles and Technology”, Sixth Edition, Elsevier, 2017.
5. Mittle,Mittal, “Basic Electrical Engineering”, 2nd Edition, Tata McGraw-Hill Edition, 2017.
6. C.L.Wadhwa, “Generation, Distribution and Utilisation of Electrical Energy”, New Age international pvt.ltd., Revised 4<sup>th</sup> Edition 2018.

**20CS201****PROGRAMMING IN C**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
3	0	0	3

**OBJECTIVES:**

- To understand the basic C programming constructs
- To learn about usage of arrays and strings
- To understand the concepts of functions, pointers, structures and unions.
- To expose to file handling operations in C

**PRE-REQUISITE: NIL****UNIT-I BASICS OF C PROGRAMMING 9**

Introduction to programming paradigms– Structure of C program– C programming– Data Types, Storage classes, Constants, Enumeration Constants – Keywords, Operators– Precedence and Associativity, Expressions – Input/output statements, Assignment statements –Decision making statements, Switch statement, Looping statements –Pre-processor directives – Compilation process.

**UNIT-II ARRAYS AND STRINGS 9**

Introduction to Arrays– Declaration, Initialization –One dimensional array –Example Program– Computing Mean, Median and Mode, Two dimensional arrays –Example Program– Matrix Operations (Addition, Scaling, Determinant and Transpose), String operations– length, compare, concatenate, copy –Selection sort, linear and binary search.

**UNIT - III FUNCTIONS AND POINTERS 9**

Introduction to functions– Function prototype, function definition, function call, Built- in functions (string functions, math functions), Recursion, Example Program– Computation of Sine series, Scientific calculator using built-in functions, Binary Search using recursive functions –Pointers, Pointer operators, Pointer arithmetic, Arrays and pointers – Array of pointers, Example Program– Sorting of names, Parameter passing– Pass by value, Pass by reference, Example Program– Swapping of two numbers and changing the value of a variable using pass by reference

**UNIT - IV STRUCTURES AND UNIONS 9**

Structure – Nested structures, Pointer and Structures, Array of structures, Example Program – using structures and pointers, typedef, Self referential structures, Union, Dynamic memory allocation, Illustrative programs – allocating block of memory, sum of n numbers using malloc, calloc.

**UNIT - V FILE PROCESSING 9**

Files – File operations, Types of file processing– Sequential access, Random access Sequential access file - Example Program– Finding average of numbers stored in sequential access file, Random access file -Example Program– Transaction processing using random access files, Command line arguments.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Use basic constructs of C programming to develop simple programs.
- Analyze the one dimensional and two dimensional arrays and develop programs to implement operations such as addition, scaling, Determinant and Transpose.
- Utilize string operations such as length, compare, concatenate and examine sorting and searching algorithm.
- Illustrate simple examples for functions and pointers and develop programs to implement pointer arithmetic, arrays with pointers and advanced concepts of functions.
- Illustrate simple programs for structures and unions and design real time application programs
- Analyze file operations and develop programs to implement various file access procedures.

**TEXT BOOKS:**

1. Balagurusamy, E, "Programming in ANSI C", Eighth Edition, Tata Mcgraw-Hill,2019.
2. YashavantKanetkar, "Let Us C", BPB Publications, 17<sup>th</sup> Edition,2020.
3. Kernighan, B.W and Ritchie,D.M, "The C Programming language" Second Edition, Pearson Education,2015.

**REFERENCES:**

1. Paul Deitel and Harvey Deitel, "C How to Program", Seventh edition, PearsonEducation India, 2015.
2. Juneja, B. L and Anita Seth, "Programming in C", CENGAGE Learning India pvt. Ltd.,2011
3. PradipDey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press,2013.
4. Byron Gottfried, "Schaum's outlines- Programming with C",McGraw-Hill Education,Fourth edition, 2018.
5. Reema Thareja, "Programming in C", Oxford University Press, Second Edition,2016.

<b>20HS2L1</b>	<b>COMMUNICATION SKILLS LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		0	0	2	1

**OBJECTIVES:**

- This course is framed for imparting practical approach in learning and enhancing communication skill to develop in students.
- Students will be able to identify appropriate expressions in speaking and writing.
- They will also be able to understand the style and perfection of language in reading and listening various contexts of engineering and technology.
- The course will benefit to the students to gain confidence for every day communication, aptitude test and interviews.

**PRE-REQUISITE: NIL**

**UNIT-I LISTENING 6**

Listen and takes notes of Lecture, Listen and Write appropriate word, Talks on Engineering and Technology, Developing effective listening skills, barriers to effective listening

**UNIT-II SPEAKING 6**

Self-Introduction, Role play of Celebrities, Sharing memorable incidents

**UNIT - III READING 6**

Reading Online Blogs, Reading Advertisement in Online, Newspaper archives reading

**UNIT - IV WRITING 6**

Process Description, Narrating experiences, Creating Email blogs, Review Writing – Books, Movies, and Journals

**UNIT - V SUMMARIZED ACTIVITIES 6**

**Reading** – cloze exercises, Identifying redundant words, Jargon words, Foreign words, Technical terms. **Writing** – Error free sentences, Sequential paragraphs, Essay writing on various levels – basic, middle, and advanced. **Speaking** – Face to face conversation on specific topics, interviewing celebrities, getting acquaintance with new people, sharing information with persons from abroad.

**TOTAL: 30 PERIODS**

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Express ideas and concepts on par global communication
- Involve inter-personal communication with flair and error-free verbatim
- Face interviews confidently and respond in proper language ability
- Participate in group discussion and share innovative ideas in technical environments
- Adapt multi-national exposure on employment
- Master all-round competency in delivering apt communication for employability

**TEXT BOOKS:**

1. E. Suresh Kumar et al. "Communication for Professional Success". Orient Blackswan: Hyderabad, 2015

**REFERENCES:**

1. Butterfield, Jeff "Soft Skills of Everyone". Cengage Learning: New Delhi, 2015
2. "Interact English Lab Manual for Undergraduate Students", Orient BlackSwan: Hyderabad, 2016.
3. Raman, Meenakshi and Sangeetha Sharma. "Professional Communication". Oxford University Press: Oxford, 2014.
4. S. Hariharanetal. "Soft Skills". MJP Publishers: Chennai, 2010



20CS2L1	C PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

**OBJECTIVES:**

- To develop programs in C using basic constructs.
- To develop applications in C using strings, pointers, functions, structures.
- To develop applications in C using file processing.

**PRE-REQUISITE: NIL**

**LIST OF PROGRAMS**

1. Programs using I/O statements, expressions and decision-making constructs
2. Program for finding given year is leap year or not and finding given number is Armstrong number or not.
3. Design a calculator to perform the operations namely, addition, subtraction, multiplication, division and square of a number.
4. Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions.
  - 5 if it is a perfect cube.
  - 4 if it is a multiple of 4 and divisible by 6.
  - 3 if it is a prime number.

Sort the numbers based on the weight in the increasing order as shown below <10,its weight>,<36,its weight><89,its weight>

5. Matrix addition and subtraction
6. Matrix multiplication and transpose of a matrix
7. Program using string with and without using string functions: string copy and Reverse the String.
8. Convert the given decimal number into binary, octal and hexadecimal numbers using user defined functions.
9. From a given paragraph perform the following using built-in functions:
  - a. Find the total number of words.
  - b. Capitalize the first word of each sentence.
  - c. Replace a given word with another word.
10. Program using recursion – factorial and Fibonacci series
11. Sort the list of numbers using pass by reference.
12. Generate salary slip of employees using structures and pointers.
13. Insert, update, delete and append telephone details of an individual or a company into a telephone directory using random access file.
14. Count the number of account holders whose balance is less than the minimum balance using sequential access file.
15. **Mini project (Any one project : Maximum 4 per Team)**
  - Railway reservation system
  - Library Management System
  - University Result Publication System
  - Hospital Management System
  - Student Automation System
  - Payroll System
  - Banking System
  - Inventory System

**PLATFORM NEEDED:** Turbo C++ Compiler

**TOTAL: 60 PERIODS**

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Develop simple programs using decision making and looping statements.
- Utilize array concepts to perform matrix addition, subtraction and multiplication.
- Utilize string operations and develop programs to show string copy and reverse.
- Develop programs using user defined functions, built-in functions and recursion.
- Design applications using sequential and random access files.
- Design simple real time projects using the concepts of structures and union.

20BS303

Discrete Mathematics

L	T	P	C
3	1	0	4

**OBJECTIVES:**

- To understand the basic concepts of Logic, Combinatorics and Graph Theory.
- To make the student familiarize the Applications of Algebraic Structures.
- To understand the concepts and significance of Lattices and Boolean Algebra which are widely used in Computer Science and Engineering.

**PRE-REQUISITE: NIL****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 REPRESENTATION OF STANDARD GRAPHS 12**

Graphs and Graph Models – Graph Terminology and special types of Graphs – Matrix Representation of Graphs and Graph Isomorphism – Connectivity – Euler and Hamilton Paths.

**UNIT-IV ALGEBRAIC STRUCTURES 12**

Algebraic Systems – Semi Groups and Monoids - Groups – Subgroups – Homomorphism's – Normal Subgroup and Cosets – Lagrange's Theorem – Definitions and Examples of Rings and Fields.

**UNIT-V LATTICES AND BOOLEAN ALGEBRA 12**

Partial Ordering – Posets – Lattices as Posets – Properties of Lattices - Lattices as Algebraic Systems – Sub Lattices – Direct Product and Homomorphism – Some special Lattices – Boolean Algebra.

**TOTAL: 60 PERIODS**

**OUTCOMES:**

**At the End of The Course, Learners Will be Able To:**

- Apply the Basic Formula to Formulate the Normal Forms and Predicate Calculus.
- Solve Combinatorial Problems using the Basic Counting Techniques.
- Solve Recurrence Relations using Generating Functions.
- Utilize the concepts of Graph Theory in the Computer Science and Technologies Field.
- Apply the concepts and Properties of Algebraic Structures such as Groups , Rings and Fields.
- Determine the Partial Ordering, Lattices as Posets and Boolean Algebra using Logical Relation

**TEXT BOOKS**

1. Tremblay.J.P. and Manohar.R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Publishingcompany Limited, New Delhi, 30<sup>th</sup> Reprint,2008.
2. Veerarajan .T, "Discrete Mathematics with graph theory andcombinatorics",Tata Mc Graw –Hill companies, New Delhi, 4<sup>th</sup> Reprint,2008.

**REFERENCES:**

1. Grimaldi. R.P., "Discrete and Combinatorial Mathematics: An AppliedIntroduction", Pearson Education Asia, Delhi, 5<sup>th</sup>Edition,2007.
2. Rosen.K.H., "Discrete Mathematics and its Applications", Tata McGraw Hill Publishing company Limited,New Delhi, 7<sup>th</sup> Edition, 2011.
3. Koshy.T. "Discrete Mathematics with Applications", Elsevier Publications,2011.
4. Venkatraman.M.K., Sridharan.V.,Chandrasekaran.C., "DiscreteMathematics", National Publishing company, 1<sup>st</sup>Edition,2001.
5. Tamilarasi.A& NatarajanA.M., "Discrete Mathematics And ItsApplication", Khanna Publishers, 3<sup>rd</sup> Edition,2006.

**20CS301 DIGITAL PRINCIPLES AND SYSTEM DESIGN**

L	T	P	C
3	1	0	4

**OBJECTIVES:**

- To design digital circuits using simplified Boolean functions
- To design and analyze combinational circuits
- To design and analyze synchronous and asynchronous sequential circuits
- To understand Memory and Programmable Logic Devices
- To write HDL code for combinational and sequential circuits

**PRE-REQUISITE:NIL**

**UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 12**

Number Systems - Arithmetic Operations - Binary Codes- Boolean Algebra and Logic Gates - Theorems and Properties of Boolean Algebra - Boolean Functions - Canonical and Standard Forms - Simplification of Boolean Functions using Karnaugh Map - Logic Gates – NAND and NOR Implementations.

**UNIT II COMBINATIONAL LOGIC 12**

Combinational Circuits – Analysis and Design Procedures - Binary Adder-Subtractor - Decimal Adder - Magnitude Comparator - Decoders – Encoders – Multiplexers - Introduction to HDL – HDL Models of Combinational circuits-Decoder-Comparator-Multiplexer.

**UNIT III SYNCHRONOUS SEQUENTIAL LOGIC 12**

Sequential Circuits - Storage Elements: Latches, Flip-Flops-Characteristic table-Excitation table-Characteristic equation-Conversion of one flip-flop into another - Analysis of Clocked Sequential Circuits - State Reduction and Assignment - Design Procedure - Registers and Counters - HDL Models of Sequential Circuits- D flip flop-JK flip flop-JK flip flop from D flip flop.

**UNIT IV ASYNCHRONOUS SEQUENTIAL LOGIC 12**

Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards.

**UNIT V MEMORY AND PROGRAMMABLE LOGIC 12**

RAM– Error Detection and Correction - ROM - Programmable Logic Array – Programmable Array Logic-An overview of sequential programmable devices.

**TOTAL: 60 PERIODS**

**OUTCOMES:**

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

- Apply Arithmetic operations in any number system and various techniques to simplify the Boolean function.
- Build combinational circuits that perform arithmetic operations.
- Design and Analyze Synchronous sequential circuits such as counters and registers.
- Design and simulate various combinational and sequential circuits using HDL.
- Analyze Asynchronous sequential circuits to find out the impact of Hazards and Races.
- Model memory arrays for any Boolean function with the help of PLA, PAL and PROM

**TEXT BOOKS**

1. M. Morris R. Mano, Michael D. Ciletti, — “Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog”, 6<sup>th</sup> Edition, Pearson Education, 2018.

**REFERENCES:**

1. G. K. Kharate, Digital Electronics, Oxford University Press, 2012
2. John F. Wakerly, Digital Design Principles and Practices, 5<sup>th</sup> Edition, Pearson Education, 2018.
3. Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, 6<sup>th</sup> Edition, CENGAGE Learning, 2013
4. Donald D. Givone, Digital Principles and Design, Tata McGraw Hill, 2017.

**20CS302 DATA STRUCTURES AND ALGORITHMS**

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To understand the concepts of ADTs
- To understand the basics of algorithm analysis
- To Learn linear data structures – lists, stacks, and queues
- To apply Tree and Graph structures
- To understand sorting, searching and hashing algorithms and their analysis.

**PRE-REQUISITE:**

Course code : 20CS201  
 Course Name :Programming in C

**UNIT I INTRODUCTION TO DATA STRUCTURES AND ALGORITHM ANALYSIS 10**

Introduction: Data Structures, Notion of an algorithm, Algorithm Efficiency and Analysis Framework, Asymptotic Notations and their properties. Linear 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 – All operations (Insertion, Deletion, Merge, Traversal). Implementation of algorithmic problems.

**UNIT II LINEAR DATA STRUCTURES – STACKS, QUEUES 8**

Stack ADT – Operations – Applications – Evaluating arithmetic expressions- Conversion of Infix to postfix expression – Queue ADT – Operations – Circular Queue – Priority Queue – deQueue – applications of Queues.

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

Tree ADT – tree traversals – Binary Tree ADT – expression trees – applications of trees – binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree – B+ Tree – Heap – Applications of heap.

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

Definition – Representation of Graph – Types of graph – Breadth-first traversal – Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.

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

Divide and Conquer Methodology: Comparison of Searching Techniques: Linear Search – Binary Search , Mathematical analysis of Binary Search. Sorting – Merge Sort, Quick Sort, Bubble sort – Selection sort – Insertion sort – Shell sort – Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**At The End of the Course, Learners Will be able to:**

- Explain the concept of asymptotic notations and algorithmic efficiency with properties.
- Describe abstract data types and implement various algorithmic problems using arrays and linked list.
- Apply the different linear data structures like stack and queue to various computing problems.
- Implement different types of trees and apply various operations on graphs and its applications.
- Inspect and Analyze different sorting and searching techniques based on time and space complexity of the algorithms designed using divide and conquer methods.
- Implement suitable hashing algorithm for indexing data items into specific locations in a hash table considering collision resolution techniques

**TEXT BOOKS**

1. Mark Allen Weiss, — Data Structures and Algorithm Analysis in C, 2nd Edition Reprint, Pearson Education, 2002.
2. Reema Thareja, — Data Structures Using C, Second Edition , Oxford University Press, 2011.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein – Introduction to Algorithms, MIT Press, 3<sup>rd</sup> edition, 2009.

**REFERENCES:**

1. Stephen G. Kochan, —Programming in C, 3<sup>rd</sup> edition, Pearson Education,2005.
2. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, — Fundamentals of Data Structures in C, 2<sup>nd</sup> Edition, University Press, 2008



20IT301 OBJECT ORIENTED PROGRAMMING

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To understand basic principle of Object-Oriented Programming
- To understand the characteristics of java and basics of java programming tool.
- To know the principles of inheritance and interfaces
- To define exceptions and use I/O streams
- To develop a java application with threads and generics classes
- To design and build simple Graphical User Interfaces

**PRE-REQUISITE:**

Course code :20CS201

Course Name : Programming in C

**UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 9**

Introduction to Object Oriented Programming –Differences between Structure programming and OOPS-Characteristics of Java – The Java Environment -Java Source File -Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays , Packages - JavaDoc comments, finalize method, Automatic Garbage Collection.

**UNIT II INHERITANCE AND INTERFACES 9**

Inheritance – the Object class – abstract classes and methods- final methods and classes – Interfaces –differences between classes and interfaces and extending interfaces - Object cloning, Reflection, Proxies -inner classes, Array Lists - Strings

**UNIT III EXCEPTION HANDLING AND I/O 9**

Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Assertions, logging, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files-Sequential Access file and Random Access file.

**UNIT IV MULTITHREADING AND GENERIC PROGRAMMING 9**

Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming – Generic classes – generic methods – Inheritance & Generics – Reflection & Generics-Bounded Types – Restrictions and Limitations.

**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: Design an application for automating the file processing by using the java swing with mysql database.

**TOTAL: 45 PERIODS****OUTCOMES:****On Completion of the course, the students should be able to:**

- Realize the Object-Oriented Programming concepts and Basics of java Programming tool
- Apply the concepts of inheritance and interfaces using java programs
- Construct java exceptions and I/O streams
- Illustrate multithread concepts and generics in java
- Develop interactive java application using AWT
- Build interactive java application using Swing

**TEXT BOOKS**

1. Herbert Schildt, “Java The complete reference”, 9<sup>th</sup> Edition, McGraw Hill Education, 2017.
2. Cay S. Horstmann, Gary cornell, “Core Java Volume –I Fundamentals”, 9<sup>th</sup> Edition, Prentice Hall, 2013.
3. E. Balagurusamy, “ Programming with Java”, 6<sup>th</sup> Edition, McGraw Hill Education, 2019.

**REFERENCES:**

1. Paul Deitel, Harvey Deitel, “Java SE 8 for programmers”, 3<sup>rd</sup> Edition, Pearson, 2015.
2. Steven Holzner, “Java 2 Black book”, Dreamtech press, 2011.
3. Timothy Budd, “Understanding Object-oriented programming with Java”, Updated Edition, Pearson Education, 2000.

20HS301

UNIVERSAL HUMAN VALUES

L	T	P	C
2	1	0	3

**OBJECTIVES:**

1. To create an awareness on Engineering Ethics and Human Values.
2. To understand social responsibility of an engineer.
3. To appreciate ethical dilemma while discharging duties in professional life

**PRE-REQUISITE: NIL**

**UNIT I Introduction to Value Education 9**

Value Education – Definition - Concept and Need for Value Education - The Evolution of Value Education: Natural acceptance, Self exploration - Fundamentals of value education - Happiness and Prosperity as parts of Value Education- fulfilling human aspirations.

**Practice sessions:** To discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

**UNIT II Harmony in the Human Being 9**

Human being vs Value education - I' and Body synchronization - Understanding Myself as Co-existence of the Self and the Body - Realization - Self, Body needs - Scanning of Karma -Self and Body- Understanding Sanyam and Health.

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

**UNIT III Harmony in the Family, Society and Nature 9**

Family as a basic unit of Human Interaction-Values in Relationships - The Basics for Trust and Respect in today's Crisis: Affection, e-Guidance, Reverence, Glory, Gratitude and Love –Harmony in society : Resolution, Prosperity, Fearlessness and Co-existence as Comprehensive Human Goal- Harmony in Nature: The Four Orders in Nature - The Holistic Perception of Harmony in Existence.

**Practice sessions:** To discuss on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education. Gratitude as a universal value in relationship. Discuss with scenarios. Elicit examples from students' lives

**UNIT IV Social Ethics 9**

The Basics for Ethical Human Conduct - Defects in Ethical Human Conduct - Holistic Alternative and Universal Order - Universal Human Order and Ethical Conduct - Human Rights violation and Social Disparities.

**Practice sessions:** To discuss human being as cause of imbalance in nature, pollution, depletion of resources and role of technology

**UNIT V Professional Ethics 9**

Value based Life and Profession - Professional Ethics and Right Understanding - Competence in Professional Ethics - Issues in Professional Ethics – The Current Scenario - Vision for Holistic Technologies, Production System and Management Models.

**Practice sessions:** To discuss the conduct as an engineer or scientist

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:**

- Explain the significance of value inputs in a classroom and start applying them in their life and profession
- Distinguish between Values & Skills to ensure happiness and prosperity.
- Distinguish between Thyself & the Body to ensure competency of an individual.
- Explain the role of a human being in ensuring harmony in society and nature.
- Distinguish between ethical and unethical practices, and apply suitable strategy to actualize a harmonious working environment.
- Develop an awareness of human values to appreciate the rights of others.

**TEXT BOOKS:**

1. R.R. Gaur, R. Asthana, G.P. Bagaria, A Foundation Course in Human Values and Professional Ethics, 2<sup>nd</sup> revised edition, Excel Books, New Delhi, Re print
2. A N Tripathy, Human Values, New Age International Publishers, New Delhi, 2003.

**REFERENCES :**

1. E G Seebauer & Robert L. Berry, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press, 2000.
2. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd, Reprint 2011.
3. Mike Martin and Roland Schinzinger "Ethics in Engineering" McGraw Hill, New York, 4th Edition , Reprint 2017.
4. Charles E. Harries, Michael S. Protchard and Michael J. Rabins, "Engineering Ethics-concepts and Cases", Thomson Learning, 2000
5. S.K. Chakraborty and Dabangshu Chakraborty, "Human Values and Ethics: Achieving Holistic Excellence", ICFAI University Press, 2006

20CS3L1

DIGITAL SYSTEMS LABORATORY

L	T	P	C
0	0	4	2

**OBJECTIVES:**

- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of classes, packages, interfaces, array list, exception handling and file processing
- To develop applications using generic programming and event handling.

**LIST OF EXPERIMENTS**

1. Verification of Boolean Theorems using basic gates
2. Design and implementation of combinational circuits using basic gates for arbitrary functions.
3. Design and implementation of code converters.
4. Design and implement Half/Full Adder and Subtractor.
5. Design and implement combinational circuits using MSI devices:
  - a. Parity generator /checker
  - b. Magnitude Comparator
  - c. Multiplexers
6. Design and implement shift-registers.
7. Design and implement synchronous counters.
8. Design and implement asynchronous counters.
9. Coding combinational circuits using HDL.
10. Coding sequential circuits using HDL.
11. Design and implementation of a simple real time digital system (Mini Project).

**TOTAL: 60 PERIODS**

**OUTCOMES:**

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

- Apply Boolean simplification techniques to construct combinational logic circuits.
- Build combinational logic circuits to perform arithmetic operations.
- Implement combinational circuits using MSI devices
- Construct Sequential circuits like registers and counters.
- Simulate combinational and sequential circuits using HDL.
- Design a simple real time application using Digital system

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

**LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS**

**HARDWARE:**

- Digital trainer kits -30
- Digital ICs required for the experiments in sufficient numbers

**SOFTWARE:**

- HDL simulator.

20CS3L2	<b>DATA STRUCTURES AND ALGORITHM LABORATORY</b>	<b>L 0</b>	<b>T 0</b>	<b>P 4</b>	<b>C 2</b>
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**OBJECTIVES:**

- Write functions to implement linear and non-linear data structure operations
- Suggest appropriate linear / non-linear data structure operations for solving a given problem
- Appropriately use the linear / non-linear data structure operations for a given problem
- Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval

**LIST OF EXPERIMENTS**

1. Implementation of List and Stack Using Array
2. Implementation of List and Stack Using Linked list
3. Implementation of Queue Using Linked List
4. Perform polynomial addition using list
5. Perform Infix to postfix conversion using stack
6. Implementation of Binary tree
7. Implementation of Binary Search tree
8. Implementation of AVL Trees
9. Implementation of Heaps using Priority Queues
10. Implementation of Graph Traverses Using Breadth First Search
11. Implementation of Graph Traverses Using Depth First Search
12. Applications of Graph.
13. Case study problem for sorting and searching
14. Case study problem using linked list

**TOTAL: 60 PERIODS****OUTCOMES:****On Completion of the course, the students should be able to:**

- Compute Array implementation of stack, Queue and List ADTs using C program
- Demonstrate Linked list implementation of list, Stack and Queue ADTs
- Manipulate Binary trees, Binary search Trees and AVL tree and its operations
- Compute graph representation and Traversal algorithms
- Examine searching, sorting and hashing algorithms.
- Implement various techniques of Data structures to Illustrate real world problems

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

Software Requirement :

- Sublime editor / Turbo C

**OBJECTIVES:**

- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of classes, packages, interfaces, array list, exception handling and file processing.
- To develop applications using generic programming and event handling.

**LIST OF EXPERIMENTS**

1. Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection (i.e domestic or commercial). Compute the bill amount using the following tariff.

If the type of the EB connection is domestic, calculate the amount to be paid as follows:

First 100 units	Rs. 1.00 per unit
101-200 units	Rs. 2.50 per unit
201 -500 units	Rs. 4.00 per unit
> 501 units	Rs. 6.00 per unit

If the type of the EB connection is commercial, calculate the amount to be paid as follows:

First 100 units	Rs. 2.00 per unit
101-200 units	Rs. 4.50 per unit
201 -500 units	Rs. 6.00 per unit
> 501 units	Rs. 7.00 per unit

2. Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa) , time converter (hours to minutes, seconds and vice versa) using packages.
3. Develop a java 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.
4. Design a Java interface for ADT Stack. Implement this interface using array. Provide necessary exception handling in both the implementations.
5. Write a program to perform string operations using Array List. Write functions for the following
  - a. Append - add at end
  - b. Insert – add at particular index
  - c. Search
  - d. List all string starts with given letter

6. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
7. Write a Java program to implement user defined exception handling.
8. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.
9. 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 the value of cube of the number.
10. Write a java program to find the maximum value from the given type of elements using a generic function.
11. Design a calculator using event-driven programming paradigm of Java with the following options.
  - a) Decimal manipulations
  - b) Scientific manipulations
12. Develop a mini project for any application using Java concepts.

**TOTAL : 60 PERIODS**

**OUTCOMES:**

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

- Develop and implement Java programs for simple applications that make use of classes, packages.
- Develop and implement Java programs with inheritance and interfaces.
- Develop simple java programs with use of files and exceptions.
- Develop simple java programs by implementing multithread concepts and generics.
- Design and Develop interactive java application using AWT and Swing .
- Design and develop of mini project.

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

**Software Requirement :**

- JDK8.0 / Net beans 11



20BS404

PROBABILITY AND STATISTICS

L	T	P	C
3	1	0	4

**OBJECTIVES:**

- This course aims at providing the required skill to apply the statistical tools in engineering problems.
- To introduce the basic concepts of probability and random variables of one and two dimensions.
- To acquaint the knowledge of testing of hypothesis for small and large samples and to introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

**PRE-REQUISITE: NIL**

**UNIT-I PROBABILITY AND RANDOM VARIABLES 12**

Probability–Discrete and continuous random variables –Moments–Moment generating functions– Binomial, Poisson, Uniform, Exponential and Normal distributions.

**UNIT-II TWO-DIMENSIONAL RANDOM VARIABLES 12**

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

**UNIT-III TESTING OF HYPOTHESIS 12**

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means-Tests based on Chi-square and F distributions for mean, variance and proportion-Contingency table (test for independent)-Goodness of fit.

**UNIT-IV DESIGN OF EXPERIMENTS 12**

Oneway and Twoway classifications-Completely randomized design–Randomized block design–Latin square design-2<sup>2</sup> factorial design.

**UNIT-V STATISTICAL QUALITY CONTROL 12**

Control charts for measurements(X and R charts)– Control charts for attributes(p, c and np charts)–Tolerance limits-Acceptance sampling

**TOTAL: 60 PERIODS**

**OUTCOMES:**

**At the End of The Course, Learners Will be Able To:**

- Build the parameters of statistical distributions using basic probability theory concepts.
- Calculate the statistical measures for One and Two dimensional random variables.
- Apply the concepts of testing of hypothesis for large samples in real life problems.
- Apply t-test, chi-square and F-distribution for small samples.
- Apply the basic concepts of classification of design of experiment in the field of agriculture.
- Apply control charts for quality control related problems.

**TEXT BOOKS**

1. Johnson. R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8<sup>th</sup> Edition, 2015.
2. Veerarajan.T., "Probability, Statistics and Random Processes", Tata McGraw Hill, New Delhi , 2006.

**REFERENCES:**

1. Papoulis.A.andUnnikrishnapillai.S., "Probability, Random Variables and Stochastic Processes", McGrawHill Education India, New Delhi, 4<sup>th</sup> Edition, 2002.
2. Spiegel.M.R., Schiller.J and Srinivasan.R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGrawHill, 3<sup>rd</sup> Edition, 2004.
3. Walpole.R.E., Myers.R.H., Myers.S.L. and Ye.K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 8<sup>th</sup> Edition, 2011.
4. Gupta.S.C., Kapoor.V.K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons Educational Publishers, New Delhi, Reprint 2013.
5. Kandasamy.P., Thilagavathi.K., Gunavathi.K., "Probability Random Variables & Random Processes", S.Chand & Co.Ltd., Reprint 2008.

20CS401

**COMPUTER ORGANIZATION AND ARCHITECTURE**

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To learn the fundamentals of a computer system and operations.
- To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit.
- To learn the basics of pipelined execution.
- To understand parallelism and multi-core processors.
- To understand the memory hierarchies and different ways of communication with I/O devices.

**PRE-REQUISITE:**

Course Code : 20CS301

Course Name : Digital Principles and System Design

**UNIT I                                  FUNDAMENTALS OF A COMPUTER SYSTEM                                  9**

Functional Units – Basic Operational Concepts- Bus structures – Performance Metrics – Instructions: Language of the Computer – Operations, Operands – Instruction Set Architecture- Instruction representation- RISC and CISC Architectures – Amdahl's Law – Logical operations – decision making – MIPS Addressing

**UNIT II                                  ARITHMETIC FOR COMPUTERS                                  9**

ALU design -Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations – Subword Parallelism

**UNIT III                                  PROCESSOR AND CONTROL UNIT                                  9**

Components of the Processor - Hardwired control – Micro programmed control – Nano programming-A Basic MIPS implementation – Building a Datapath – Control Implementation Scheme – Pipelining – Pipelined datapath and control – Hazards – Structural, Data and Control Hazards –Exception handling. Building blocks of Raspberry-pi.

**UNIT IV                                  PARALLELISIM                                  9**

Parallel processing challenges – Instruction Level Parallelism - Exploitation of more ILP – Hardware and Software Approaches – Dynamic Scheduling – Speculation – Compiler Approaches – Multiple Issue Processors - ILP and Thread Level Parallelism-Flynn's classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors

**UNIT V**

**MEMORY & I/O SYSTEMS**

**9**

Memory Hierarchy - memory technologies – cache memory – measuring and improving cache performance – virtual memory- Memory management techniques – Associative memories - TLB's – Accessing I/O Devices – Interrupts – Direct Memory Access – Bus structure – Bus operation – Arbitration – Interface circuits - USB.

**Case Study:** Design of Memory Systems using Raspberry Pi

**TOTAL: 45 PERIODS**

**OUTCOMES:**

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

- Explain the computer organization components, instructions and addressing modes
- Compute the arithmetic operations such as Addition, Subtraction, Multiplication & Division
- Discuss the basics of MIPS implementation and pipelining
- Illustrate the basic concepts of parallelism, multi-core processor, GPU & Clusters
- Describe the memory technologies & I/O systems
- Generalize the memory systems using Raspberry-pi

**TEXT BOOKS**

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, 5<sup>th</sup> Edition, Morgan Kaufmann / Elsevier, 2014.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, 6<sup>th</sup> Edition, Tata McGraw Hill, 2012.

**REFERENCES:**

1. John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach, Morgan Kaufmann / Elsevier Publishers, 5<sup>th</sup> Edition, 2012.
2. John P. Hayes, Computer Architecture and Organization, 3<sup>rd</sup> Edition, Tata McGraw Hill, 2012.
3. William Stallings, Computer Organization and Architecture – Designing for Performance, 8<sup>th</sup> Edition, Pearson Education, 2010.
4. Learning Computer Architecture using Raspberry pi – Eben Upton, Jeffrey Duntmann 2016 (1<sup>st</sup> Edition)

<b>20CS402</b>	<b>DATABASE MANAGEMENT SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To learn the fundamentals of data models and to depict a database system using ER diagrams.
- To study relational database and to write SQL queries to store/retrieve data to/from database.
- To understand the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures for real time applications.
- To understand working procedures of query processing and query optimization techniques.
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To study concepts of advanced databases.

**PRE-REQUISITE:**

Course Code : 20CS302

Course Name :Data Structures and Algorithms

**UNIT I DATABASE FUNDAMENTALS 8**

Purpose of Database System – Views of data – Database System Architecture – Introduction to Data Models – Network model – Hierarchical Model – Introduction to Relational Model – Constraints – keys – Entity Relationship Model – Entity Sets – Attributes - Extended E-R features – ER reduction to Relational Schemas

**UNIT II RELATIONAL DATABASE 10**

Structure of Relational Database – Relational Query Language – Relational Algebra – SQL Fundamentals – Basic Queries – Set Operations – Aggregate Functions – Clauses – Subqueries – Correlated Subqueries – Joins – Views – Authorization – Advanced SQL – Triggers – Cursors – Procedure – Functions – Embedded SQL – Dynamic SQL – Types of advanced Databases – Distributed Database and Object Oriented Database Architectures - XML Databases: XML Hierarchical Model, DTD, XML Schema, X-Query - Introduction to NoSQL.

**UNIT III DATABASE DESIGN 9**

Need for Database Design – Functional Dependencies – Closure of Functional Dependencies – Attribute Closure – Dependency Preservation – Decomposition – Canonical Cover – First Normal Form – Second Normal Form – Third Normal Form –Boyce Code Normal Form – Multivalued Dependencies - Fourth Normal Form – Join Dependencies – Fifth Normal Form

**UNIT IV****TRANSACTIONS****9**

Transaction Concepts – ACID properties – Transaction States – Serializability – Conflict Serializability – View Serializability – Concurrency Control – Lock Based Protocols – Deadlocks – Time Based Protocols – Stamp Based Protocols – Validation Based Protocols – Recovery System – Failure Classifications – Storage – Recovery and Atomicity – Recovery Algorithms

**UNIT V****STORAGE AND QUERY PROCESSING****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 – Algorithms for SELECT and JOIN operations – Query optimization using Heuristics and Cost Estimation.

**TOTAL: 45 PERIODS****OUTCOMES:****On Completion of the course, the students should be able to:**

- Compare File Processing System with Database and summarize the basic concepts of Database, various Data Models and Database System Architecture.
- Identify Entities, Attributes and their Relationships to prepare ER diagram for real time applications.
- Transform an information model into a relational database schema and use DDL, DML, DQL, DCL, TCL and advanced concepts of SQL to implement the schema.
- Develop simple database using XML and relate advanced databases with relational model.
- Design a database by identifying dependencies and optimize it with suitable normal forms to reduce redundancy.
- Compare real time applications with respect to transaction, concurrency control, and data object locking protocols and select appropriate storage and recovery techniques.
- Identify the purpose of query processing and query optimization techniques and also demonstrate the query evaluation for given query.

**TEXT BOOKS**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, —Database System ConceptsII, Sixth Edition, Tata McGraw Hill, 2011.
2. RamezElmasri, Shamkant B. Navathe, —Fundamentals of Database SystemsII, Sixth Edition, Pearson Education, 2011.

**REFERENCES:**

1. C.J.Date, A.Kannan, S.Swamynathan, —An Introduction to Database SystemsII, Eighth Edition, Pearson Education, 2006.
2. Raghu Ramakrishnan, —Database Management SystemsII, Fourth Edition, McGraw-Hill College Publications, 2015.
3. G.K.Gupta, "Database Management Systems, Tata McGraw Hill, 2011O G Palanna, "Engineering Chemistry", McGraw Hill Education (India) PVT, LTD, Chennai, 2017.

**20IT401      DESIGN AND ANALYSIS OF ALGORITHMS**

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To understand and apply the algorithm analysis techniques.
- Analyse the asymptotic performance of algorithms.
- To understand different algorithm design techniques.
- To apply the appropriate algorithm for solving different applications
- To understand the limitations of Algorithmic power.

**PRE-REQUISITE:**

Course Code : 20CS302

Course Name : Data Structures and Algorithms

**UNIT I INTRODUCTION**

**9**

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency –Asymptotic Notations and their properties. Analysis Framework – Empirical analysis - Solving Methods of Recurrence Relations - Mathematical analysis for Recursive and Non-recursive algorithms.

**UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER**

**9**

Brute Force – Computing  $a^n$  – String Matching - Closest-Pair and Convex-Hull Problems - Exhaustive Search - Travelling Salesman Problem - Knapsack Problem - Assignment problem. Divide and Conquer Methodology – Binary Search – Merge sort – Quick sort – Heap Sort -Multiplication of Two Large Matrices- Closest-Pair and Convex - Hull Problems

**UNIT III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE**

**9**

Dynamic programming – Principle of optimality - Coin changing problem, Computing a Binomial Coefficient – Floyd’s algorithm – Multi stage graph - Optimal Binary Search Trees – Knapsack Problem and Memory functions. Greedy Technique – Container loading problem - Prim’s algorithm and Kruskal’s Algorithm – 0/1 Knapsack problem -Building Huffman Trees

**UNIT IV ITERATIVE IMPROVEMENT**

**9**

Linear Programming Problem - Graphical solution to Linear Programming Problem - The Simplex Method - The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs, Stable marriage Problem.

**UNIT V COPING WITH THE LIMITATIONS OF ALGORITHM POWER**

**9**

Lower - Bound Arguments - Relation between P, NP NP- Complete and NP Hard Problems. Backtracking – n-Queen problem - Subset Sum Problem. Branch and Bound – Assignment problem – Knapsack Problem – Travelling Salesman Problem - Approximation Algorithms for NP-Hard Problems – Travelling Salesman problem – Knapsack problem.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

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

- Recognize different algorithm design technics for solving various problems.
- Analyze the recursive and non-recursive algorithms
- Design and analyse of different problems under divide and conquer methodology and brute force techniques
- Design and analyse the various problems under greedy algorithm and dynamic programming.
- Design and analyse the various problems under iterative algorithms.
- Analyse the limitations of various algorithmic methodologies..

**TEXT BOOKS**

1. AnanyLevitin, -Introduction to the Design and Analysis of Algorithmsl, 3<sup>rd</sup>Edition, Pearson Education,2012.
2. Ellis Horowitz, Sartaj Sahni and SanguthevarRajasekaran, Computer Algorithms/ C++, 2<sup>nd</sup> Edition, Universities Press,2007.

**REFERENCES:**

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, -Introduction to Algorithmsl, 3<sup>rd</sup> Edition,PHILearningPrivateLimited,2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, -Data Structures and Algorithmsl, Pearson Education, Reprint2006.
3. Harsh Bhasin,-Algorithms Design and Analysis, Oxford university press,2015.



20HS401	<b>ENVIRONMENTAL SCIENCE AND ENGINEERING</b>	<b>L</b> <b>2</b>	<b>T</b> <b>0</b>	<b>P</b> <b>0</b>	<b>C</b> <b>2</b>
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**OBJECTIVES:**

- To study the scope and significance of environment
- To understand the interrelationship between living organism and environment
- To get a conceptual knowledge on various types of pollution and its effects
- To gain knowledge on various natural resources and its significances
- To provide knowledge on solid wastes, disposal methods and natural disasters and its management
- To learn social issues such as human welfare, sustainability related to population

**PRE-REQUISITE:NIL**

**UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 6**

Environment – definition, importance, public awareness Ecosystem – concept, structure and function– producers, consumers and decomposers - characteristic features, structure and function of the forest ecosystem and grassland ecosystem Biodiversity– definition, types - genetic, species and ecosystem diversity – values - consumptive use, productive use, social, ethical, aesthetic and option values – hot-spots of biodiversity –threats to biodiversity: habitat loss, poaching of wildlife – endangered and endemic species of India. Assignment on Conservation of biodiversity.

**UNIT II ENVIRONMENTAL POLLUTION 6**

Definition, causes, effects and control measures of (i) Air pollution (ii) Water pollution (iii) Soil pollution (iv) Marine pollution – role of an individual in prevention of pollution – pollution case studies -Climate change - global warming, acid rain, ozone layer depletion.

**UNIT III NATURAL RESOURCES 6**

**Forest resources:** Uses, over-exploitation, deforestation, case studies**Water resources:** Surface water and ground water - uses, over-utilization, conflicts over water, Conservation of water - rain water harvesting, dams-benefits and problems **Mineral resources:** uses, over exploitation, environmental effects of extracting mineral resources, case studies.

**UNIT IV SOLID WASTE AND DISASTER MANAGEMENT 6**

Solid waste management -Introduction, types, effects on human beings and disposal management.Disaster management-Introduction, causes, effects and management of flood, cyclone, earthquake, landslide disasters, case studies– roles and responsibilities of Government and community

**UNIT V HUMAN POPULATION AND SOCIAL ISSUES 6**

Population growth, population explosion – family welfare programme –women and child welfare – human rights – value education – sustainable development – resettlement and rehabilitation –waste land reclamation – role of information technology in environment and human health. Debate on women and child welfare.

**TOTAL: 30 PERIODS**

**OUTCOMES:**

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

- Describe the environment, ecosystem and their significances.
- Identify the threats to biodiversity.
- Identify the sources and implement technological solution to Environmental pollution.
- Develop the knowledge on various natural resources and its effect on environment due to over utilization.
- Describe the disposal techniques of solid wastes and Record the consequences of natural disasters.
- Outline the social issues such as welfare, sustainability etc., and to relate with population growth.

**TEXT BOOKS**

1. Anubha Kaushik and Kaushik C.P., Environmental Science and Engineering, New Age International (P) Ltd, 6<sup>th</sup> Edition, 2018.
2. Benny Joseph, Environmental Science and Engineering, Tata McGraw-Hill Publishing Company Ltd, New Delhi, ISBN: 0070601690, 2006.

**REFERENCES:**

1. ErachBharucha, "Text book of Environmental Studies", Universities Press (I) PVT LTD, Hyderabad, 2015
2. G. Tyler Miller and Scott E.Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014
3. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", 2<sup>nd</sup> edition, Pearson Education, 2004

20CS404

**OPERATING SYSTEMS**

L	T	P	C
3	0	2	4

**OBJECTIVES:**

- To understand the basic concepts and functions of operating systems.
- To understand Processes and Threads
- To analyze Scheduling algorithms.
- To understand the concept of Deadlocks.
- To analyze various memory management schemes.
- To understand I/O management and File systems.
- To study various operating systems like Distributed OS, Real-Time OS and basic concepts of virtualization

**PRE-REQUISITE:**NIL

**UNIT I OPERATING SYSTEM OVERVIEW 9**

Operating system overview-objectives and functions, Evolution of Operating System, Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot. Processes - Process Concept, Process Scheduling, Operations on Processes, Inter Process Communication.

**LAB COMPONENT 6**

1. Basic Linux Commands and Overview
2. Write Shell Script to experiment with system calls like fork, grep, pipe, open, create read, write, etc.

**UNIT II PROCESS MANAGEMENT AND CONCURRENCY CONTROL 9**

CPU Scheduling - Scheduling criteria, Scheduling algorithms; Threads- Overview, Multithreading models, Threading issues; Process Synchronization - The critical-section problem, Semaphores, Classic problems of synchronization, Monitors; Deadlock - System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock

**LAB COMPONENT 6**

1. Implementation of FCFS, SJF, Round Robin, Priority Scheduling Algorithms and analyzing their performance
2. Implement semaphore for solving producer-consumer problem using threads.
3. Simulate situations for testing Deadlock avoidance algorithm.

**UNIT III STORAGE MANAGEMENT 9**

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation; Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory.

**LAB COMPONENT 6**

1. Implementation Of FIFO, LRU, Optimal Page Replacement Algorithms

**UNIT IV MASS STORAGE AND FILE SYSTEMS 9**

Mass Storage system – Disk Structure, Disk Scheduling and Management; File-System- File concept, Access methods, File Sharing and Protection, Allocation Methods, Free Space Management; Directory- Structure, organization, implementation.

**LAB COMPONENT 6**

1. Implementation of Directory organizations like – single, two-level, hierarchy
2. Implementation of Allocation methods used for files like – sequential, indexed, linked

**UNIT V ADVANCED OPERATING SYSTEMS AND VIRTUALIZATION 9**

Basics of Network Operating System, Server Operating System , Real Time Operating System and Distributed operating systems - Virtual machines- supporting multiple operating systems simultaneously on a single hardware platform; running one operating system on top of another.

**LAB COMPONENT 6**

1. Case Study to Learn Virtualization platforms – VM Ware, etc.
2. Installation of Raspbian OS in Raspberry pi
3. Simple C programs to execute OS services using Raspberry pi

**TOTAL: 75 PERIODS****OUTCOMES:****On Completion of the course, the students should be able to:**

- Apply the basic functions of Operating System and Process communications.
- Analyze the performance of CPU scheduling algorithms specifically FCFS, SJF, Priority and Round Robin.
- Apply various process synchronization methods and deadlock avoidance algorithm for a given scenario.
- Design memory management schemes using paging and segmentation
- Execute various file allocation methods and directory structures.
- Classify different operating systems and make use of virtualization platform to build virtual machines

**TEXT BOOKS**

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, — Operating System Concepts, 10th Edition, John Wiley and Sons Inc., 2018.
2. William Stallings, “Operating Systems – Internals and Design Principles”, 7th Edition, Prentice Hall, 2011.

**REFERENCES:**

1. RamazElmasri, A. Gil Carrick, David Levine, — Operating Systems – A Spiral Approachll, Tata McGraw Hill Edition, 2010.
2. Achyut S.Godbole, Atul Kahate, — Operating Systems, McGraw Hill Education, 2016.
3. Andrew S. Tanenbaum, “Modern Operating Systems”, Fourth Edition, Pearson Publications, 2014

20CS4L1	<b>DATABASE MANAGEMENT SYSTEMS LABORATORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**OBJECTIVES:**

- To write and debug Database commands.
- To implement advanced query in Database tool.
- To use functions and procedures for implementing simple logics in Database.
- To design real time applications using front end tool and Database.
- To implement Database connectivity for real time application.

**LIST OF EXPERIMENTS**

1. Data Definition and Data Manipulation Language Commands.
2. Data Control and Transaction Control Language Commands.
3. Aggregate Functions and Set Operations.
4. Nested Subqueries and Join Queries.
5. Views, Indexes and Synonyms.
6. Study of PL/SQL programs
7. PL/SQL - procedures
8. PL/SQL - Functions
9. PL/SQL - Triggers
10. PL/SQL - Cursor
11. Front end application development – Create Forms, Menu and Reports.
12. Implementation of Database Connectivity

**TOTAL: 60 PERIODS****OUTCOMES:****On Completion of the course, the students should be able to:**

- Develop simple Database using DDL, DML and TCL commands.
- Create Relational Database for real time application through Database constraints.
- Write and execute complex queries using subqueries and join queries.
- Develop PL/SQL programs to implement simple logics using Stored Procedure, Functions, Triggers and Cursor.
- Design a front end application to display forms, menu and reports.
- Design real time applications with Database Connectivity.

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:****SOFTWARE:**

- Oracle/Mysql/Visual Basics/Netbeans IDE

20HS4L2	PROFESSIONAL COMMUNICATION LABORATORY	L	T	P	C
		0	0	2	1

**OBJECTIVES:**

- To imparting practical approach in learning and enhancing communication skill among engineering students.
- To identify appropriate expressions in speaking and writing.
- To understand the style and perfection of language in reading and listening various contexts of engineering and technology.
- To gain confidence for every day communication, technical presentation, aptitude test and interviews.

**UNIT I Listening 6**

Listen and takes notes of Lecture, Talks on Engineering and Technology, Developing Effective listening skills, barriers to effective listening, Listening self-Introduction Videos.

**UNIT II Speaking 6**

Self-Introduction, Introduce oneself to the audience, Sharing memorable incidents, Individual presentation practice, Introduction to Group Discussion, GD strategies activities to improve GD skills

**UNIT III Reading 6**

Reading Online Blogs, Reading Advertisement in Online, Newspaper archives reading, Reading FAQ's related to job Interview, General awareness of current affairs

**UNIT IV Writing 6**

Process Description, Narrating experiences, Creating Email blogs, Review Writing –Books, Movies, and Journals, Job Application Letter, Resume Writing

**UNIT V Summarized Activities 6**

Reading – cloze exercises, Identifying redundant words, Jargon words, Foreign words, Technical terms Writing – Error free sentences, Essay writing on various levels – basic, middle, and advanced, Preparing Job application letter and Resume Speaking – Face to face conversation on specific topics, Answering Interview Questions, Panel Interview, Participating in Group Discussions, Technical Presentation

**TOTAL: 30 PERIODS**

**OUTCOMES:**

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

- Listen and Respond global English appropriately
- Participate in group discussions towards placement drive
- Make effective presentations of technical topics
- Communicate with effective technological skills
- Read and Write the context cohesively and coherently and organize ideas logically in workplace situations
- Attend job interviews and be successful in them

**TEXT BOOKS**

1. E. Suresh Kumar et al. Communication for Professional Success. OrientBlackswan: Hyderabad, 2015

**REFERENCES:**

1. Butterfield, Jeff Soft Skills of Everyone. Cengage Learning: New Delhi, 2015
2. Interact English Lab Manual for Undergraduate Students,. Orient BlackSwan:Hyderabad,2016.
3. Raman, Meenakshi and Sangeetha Sharma. Professional Communication.OxfordUniversityPress: Oxford, 2014.
4. S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.

20CS501

## COMPUTER NETWORKS

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To understand the concept of layering and functions of each layers of the protocol suits
- To be familiar with the components required to build different types of networks
- To learn concepts related to network addressing and routing
- To familiarize the functions and protocols of the layer of Transport layer
- To understand the working of various application layer protocols

### PRE-REQUISITE: NIL

#### UNIT - I INTRODUCTION TO NETWORKS 10

Network Introduction: Evolution of Computer Networks, Classification of computer Networks LAN, WAN, MAN, Network Topology: BUS, STAR, RING, MESH, OSI Layered Architecture, TCP/IP Protocol Suite.

#### UNIT - II MEDIA ACCESS & INTER NETWORKING 8

Medium Access Control Techniques: Random, Round Robin, Reservation: ALOHA Pure and Slotted, CSMA/CD-CSMA/CA- Ethernet-Token Ring-Token Bus-ARQ 3 Types, Data Link Layer design issues: Error Detection Codes, Parity Check, Checksum Error Correction Codes, Hamming codes, IEEE Standards: Bluetooth (802.15), Basic Internetworking: IP -CIDR-ARP - DHCP -ICMP

#### UNIT - III NETWORK DEVICES AND NETWORK LAYER 9

Network Devices: Router, Switch, HUB, Bridge, Routing: Static Routing, Introduction to dynamic Routing, RIP v1 and RIP v2-OSPF-DSDV, IPV6 Addressing - IPV6 Protocol.

#### UNIT - IV TRANSPORT LAYER 9

Overview of Transport layer: UDP - Reliable byte stream (TCP), Connection Management: Flow control – Retransmission – TCP Congestion control, Congestion avoidance: DECbit -RED.

#### UNIT - V APPLICATION LAYER 9

Traditional applications: SSH –HTTP – FTP –DNS – SNMP- Telnet

**TOTAL: 45 PERIODS**

### TEXT BOOKS:

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013

### REFERENCES:

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. Nader F. Mir, Computer and Communication Networks, Second Edition, PrenticeHall, 2014.
3. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An OpenSource Approach, McGraw Hill Publisher, 2011.
4. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.



Course Name : COMPUTER NETWORKS										Course Code : 20CS501				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C301.1	Familiarize the basic layers and its functions in computer networks									1	K2	1,2		
C301.2	Understand the performance of a network									2	K2	1,2		
C301.3	Understand how the data flows from one node to another									3	K2	1,2		
C301.4	Analyze and design routing algorithms									4	K3	1,2,3	2	
C301.5	Understand the various protocol functions in the network									5	K2	1,2		
C301.6	Describe the working of various application layer protocols									5	K2	1,2	2	
CO-PO mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C301.1	2	1								1				
C301.2	2	1												
C301.3	2	1								1				
C301.4	3	2	1											1
C301.5	2	1								1		1		
C301.6	2	1								1		1		1

**OBJECTIVES:**

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

**REQUISITE : NIL****UNIT - I SOFTWARE PROCESS AND AGILE DEVELOPMENT 10**

Introduction to Software Engineering, Software Process, Process Models – Introduction to Agility- Agile process-Extreme programming-XP Process.

**UNIT - II REQUIREMENTS ANALYSIS AND SPECIFICATION 8**

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

**UNIT - III SOFTWARE DESIGN 9**

Design Engineering: Design process and design quality, design concepts, the design model.

Creating a Architectural Design: Architectural styles, Architectural Design, Architectural Mapping using Data Flow. Conceptual model of UML: basic structural modeling, use case diagram, class diagrams, sequence diagrams, collaboration diagrams, state chart diagram, activity diagram, component diagrams, deployment diagram.

**UNIT - IV IMPLEMENTATION AND TESTING 9**

Reengineering process model-Reverse and Forward Engineering- Software testing fundamentals- Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging.

**UNIT - V PROJECT MANAGEMENT AND QUALITY ASSURANCE MODELS 9**

Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model –Risk Management – Identification, Projection -RMMM Plan- Models for Quality Assurance – ISO–9000 – Series – CMM

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Roger S. Pressman, -II Software Engineering – A Practitioner"s ApproachII, Eight Edition, McGraw-Hill International Edition, 2015
2. Ian Sommerville, - --Software EngineeringII, 10th Edition, Pearson Education Asia, 2016.
3. Craig Larman, —Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative DevelopmentII, Third Edition, Pearson Education, 2005..

**REFERENCES:**

1. Rajib Mall, —Fundamentals of Software EngineeringII, Third Edition, PHI LearningPrivateLimited, 2009.
2. Ali Bahrami - Object Oriented Systems Development - McGraw Hill International Edition -1999.

Course Name : SOFTWARE ENGINEERING										Course Code : 20CS502				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C302.1	Identify the key activities in managing a software project.									1	K2	1,2		
C302.2	Compare different process models.									2	K2	1,2		
C302.3	Concepts of requirements engineering and Analysis Modeling.									3	K2	1,2	2	
C302.4	Apply systematic procedure for software design and deployment.									4	K3	1,2,3	1,2	
C302.5	Express software design with UML diagrams									3	K2	1,2	1,2	
C302.6	Compare and contrast the various testing and maintenance.									5	K2	1,2	1,2	
CO PO MAPPING														
CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C302.1	2	1								1				
C302.2	2	1												
C302.3	2	1								1				1
C302.4	3	2	1										2	2
C302.5	2	1								1		1	1	1
C302.6	2	1								1		1	1	2

20EC506

**MICROCONTROLLERS & EMBEDDED  
SYSTEMS**

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To study the Architecture of 8051 microcontroller.
- To design a microcontroller based system.

- To understand the concepts of embedded system design and analysis.
- To learn the architecture of ARM processor and peripherals.
- To learn the basic concepts of embedded programming .

### **PRE-REQUISITE:**

Course code: 20CS401

Course Name: Computer Organization and Architecture

#### **UNIT - I      MICROCONTROLLER      9**

Architecture of 8051 — Special Function Registers(SFRs) — I/O Pins Ports and Circuits — Instruction set — Addressing modes — Assembly language programming, Comparison of Microprocessor and Microcontroller.

#### **UNIT - II      INTERFACING MICROCONTROLLER      9**

Programming 8051 Timers — Serial Port Programming — Interrupts Programming — LCD & Keyboard Interfacing — ADC, DAC & Sensor Interfacing — External Memory Interface- Stepper Motor and Waveform generation.

#### **UNIT - III      INTRODUCTION TO EMBEDDED SYSTEM DESIGN      9**

Complex systems and micro processors— Embedded system design process –Design example: Model train controller- Design methodologies- Design flows - Requirement Analysis – Specifications- System analysis and architecture design – Quality Assurance techniques - Designing with computing platforms – consumer electronics architecture – platform-level performance analysis.

#### **UNIT - IV      ARM PROCESSOR AND PERIPHERALS      9**

ARM Architecture Versions – ARM Architecture – Instruction Set – Stacks and Subroutines – Features of the LPC 214X Family – Peripherals – The Timer Unit – Pulse Width Modulation Unit – UART.

#### **UNIT - V      EMBEDDED PROGRAMMING      9**

Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.

**TOTAL: 45 PERIODS**

### **TEXT BOOKS:**

1. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, —The 8051 Microcontroller and Embedded Systems: Using Assembly and CII, Second Edition, Pearson education, 2011.
2. Marilyn Wolf, —Computers as Components - Principles of Embedded Computing System DesignII, Third Edition —Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.

**REFERENCES:**

1. M.Senthilkumar, M.Saravanan, S.Jeevananthan, —Microprocessors and Microcontrollers|| OXFORD University Press 2013.
2. Lyla B.Das, Embedded Systems : An Integrated Approach|| Pearson Education, 2013.
3. Sriram V Iyer, Pankaj Gupta, Embedded Real Time Systems Programming||, Tata Mc Graw Hill, 2004.
4. David. E. Simon, An Embedded Software Primer||, 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007

Course Name : MICROCONTROLLERS & EMBEDDED SYSTEMS											Course Code : 20EC506			
Co	Course Outcomes										Unit	K-CO	POs	PSOs
C303.1	Realize the architecture of 8051 and its addressing modes.										1	K2	1,2	
C303.2	Write 8051 Assembly language Programs.										1	K2	1,2	
C303.3	Interface the microcontroller with various input output devices										2	K2	1,2	
C303.4	Realize the concepts of embedded system design										3	K2	1,2	
C303.5	Realize the architecture of ARM processor.										4	K2	1,2	
C303.6	Understand the basics of embedded programming										5	K2	1,2	
CO PO MAPPING														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C303.1	2	1								1				
C303.2	2	1										1		
C303.3	2	1								1				
C303.4	2	1										1		
C303.5	2	1								1				
C303.6	2	1								1		1		

**20EC304**

**ANALOG & DIGITAL COMMUNICATION**

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To understand analog & Digital Communication Techniques.
- To Learn Data & Pulse modulation Techniques. .
- To be familiarized with source & Error Control Coding.
- To Gain Knowledge on multi-user radio communication.

**PRE-REQUISITE: NIL**

**UNIT - I ANALOG COMMUNICATION**

**9**

Introduction to Communication Systems - Modulation – Types - Need for Modulation. Theory of Amplitude Modulation - Evolution and Description of SSB Techniques - Theory of Frequency and Phase Modulation – Comparison of Analog Communication Systems (AM – FM – PM).

**UNIT - II PULSE AND DATA COMMUNICATION**

**9**

**Pulse Communication:** Pulse Amplitude Modulation (PAM) – Pulse Time Modulation (PTM) – Pulse code Modulation (PCM) - Comparison of various Pulse Communication System (PAM – PTM-PCM)

**Data Communication:** History of Data Communication - Standards Organizations for Data Communication- Data Communication Circuits - Data Communication Codes - Data communication Hardware - serial and parallel interfaces.

**UNIT - III DIGITAL COMMUNICATION**

**9**

Amplitude Shift Keying (ASK) – Frequency Shift Keying (FSK)–Phase Shift Keying (PSK) – BPSK – QPSK – Quadrature Amplitude Modulation (QAM) – 8 QAM – 16 QAM – Bandwidth Efficiency– Comparison of various Digital Communication System (ASK – FSK – PSK – QAM).

**UNIT - IV      SOURCE AND ERROR CONTROL CODES      9**

Entropy, Source encoding theorem, Shannon fano coding, Huffman coding, mutual information, channel capacity, Error Control Coding, linear block codes, cyclic codes - ARQ Techniques.

**UNIT - V      MULTI-USER RADIO COMMUNICATION      9**

Global System for Mobile Communications (GSM) - Code division multiple access (CDMA) – Cellular Concept and Frequency Reuse - Channel Assignment and Handover Techniques - Overview of Multiple Access Schemes - Satellite Communication - Bluetooth.

**Case Study:** GSM module - Design using Arduino/Raspberry pi

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Wayne Tomasi -II Advanced Electronic Communication SystemsII, 6th Edition, Pearson Education, 2009.
2. Simon Haykin, -II Communication SystemsII, 5th Edition, John Wiley & Sons, 2009

## REFERENCES:

1. Rappaport T.S, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson Education, 2007
2. H.Taub, D L Schilling and G Saha, —||Principles of Communication||, 4th Edition, Pearson Education, 2013.
3. B. P.Lathi, —||Modern Analog and Digital Communication Systems||, 4th Edition, Oxford University Press, 2017.
4. Blake, —||Electronic Communication Systems||, 2nd Edition Thomson Delmar Publications, 2004.
5. Martin S.Roden, —||Analog and Digital Communication System||, 5th Edition, Prentice Hall of India, 2002.
6. B.Sklar, —||Digital Communication Fundamentals and Applications|| 2nd Edition Pearson Education 2007.

Course Name : ANALOG & DIGITAL COMMUNICATION											Course Code : 20EC304			
Co	Course Outcomes										Unit	K-CO	POs	PSOs
C304.1	strate analog communication techniques										1	K2	1,2	
C304.2	termine pulse communication techniques										2	K2	1,2	
C304.3	strate data communication techniques										2	K2	1,2	
C304.4	plement digital communication techniques										3	K3	1,2,3	
C304.5	derstand the various error control coding techniques to identify/correct errors										4	K2	1,2,3	
C304.6	derstand the concepts of Mobile & Satellite Communications										5	K2	1,2	
CO PO MAPPING														
Course outcomes ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C304.1	2	1								1				
C304.2	2	1										1		
C304.3	3	2	1							1				
C304.4	3	2	1									1		
C304.5	2	1								1				
C304.6	2	1								1		1		



20MC501

**CONSTITUTION OF INDIA**

L	T	P	C
1	0	0	0

**OBJECTIVES:**

- To enable the student to understand the importance of the constitution.
- To understand the structure of executive, legislature, and judiciary.
- To understand the philosophy of fundamental rights, duties and Emergency Provisions.
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court.
- To understand the central and state relation financial and administrative.

**PRE-REQUISITE: NIL**

**UNIT - I INTRODUCTION**

**3**

History of Making of the Indian Constitution - Drafting Committee - (Composition & Working) - Philosophy of the Indian Constitution – Preamble - Salient Features

**UNIT - II CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES**

**3**

Fundamental Rights - Right to Equality - Right to Freedom - Right against Exploitation Right to Freedom of Religion - Cultural and Educational Rights - Right to Constitutional Remedies Directive Principles of State Policy - Fundamental Duties

**UNIT - III ORGANS OF GOVERNANCE**

**3**

Parliament – Composition - Qualifications and Disqualifications - Powers and Functions - Executive President – Governor - Council of Ministers - Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions

**UNIT - IV EMERGENCY PROVISIONS**

**3**

Emergency Provisions - National Emergency, President Rule, Financial Emergency

**UNIT - V LOCAL ADMINISTRATION**

**3**

District's Administration head- Role and Importance - Municipalities – Introduction - Mayor and role of Elected Representative - CEO of Municipal Corporation - Pachayat raj – Introduction – PRI - Zila Pachayat Elected officials and their roles - CEO Zila Pachayat - Position and role-Block level - Organizational Hierarchy (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy

**TOTAL: 15 PERIODS**

**TEXT BOOKS:**

1. Rajesh Kumar, 'Universal's Guide to the Constitution of India', Universal Law Publications, 2016.
2. D.C. Gupta, 'Indian Government and Politics', Vikas Pub, 2018.

**REFERENCES:**

1. H.M.Sreevai, 'Constitutional Law of India', 4th edition in 3 volumes, Universal Law Publication.
2. J.C. Johari, 'Indian Government and Politics', Shoban Lal & Co, 2012.
3. Noorani A.G.,(South Asia Human Rights Documentation Centre), 'Challenges to Civil Rights Guarantees in India', Oxford University Press, 2012.

Course Name : CONSTITUTION OF INDIA										Course Code : 20MC501				
CO	Course Outcomes										Unit	K –CO	POs	PSOs
C306.1	Explain history and philosophy of Indian Constitution.										1	K2	,8,9,10	-
C306.2	Explain the premises informing the twin themes of liberty and freedom from a civil rights perspective.										2	K2	,8,9,10	-
C306.3	Explain the powers and functions of Indian government										3	K2	,8,9,10	-
C306.4	Explain the emergency rules of Indian Constitution.										4	K2	,8,9,10	-
C306.5	Explain the structure and functions of local administration.										5	K2	,8,9,10	-
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C306.1	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C306.2	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C306.3	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C306.4	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C306.5	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C306	-	-	-	-	-	3	-	2	2	2	-	-	-	-

20IT501

WEB PROGRAMMING

L	T	P	C
3	0	2	4

**OBJECTIVES:**

- To understand the technologies used in Web Programming
- To learn server side programming using servlets and JSP.

- To learn the concepts of web based application using sockets.
- To understand about client-server communication and protocols used during communication
- To design interactive web pages using Scripting languages, XML /XSLT.
- To develop an ability to design and implement static and dynamic website

**PRE-REQUISITE:**

**Course code: 20CS303**

**Course Name:- Object Oriented Programming**

**UNIT - I WEB ESSENTIALS AND MARK-UP LANGUAGES 15**

**Web Essentials:** Web browser architecture, The Internet, Basic Internet Protocols, The World Wide Web, HTTP request message-response message, Web Clients Web Servers **Mark-up Languages:** An Introduction to HTML, History-Versions, Fundamental HTML Elements, Syntax and semantics, Basic Tags, Headers, Linking, List, Tables, Images, Forms, Frames, HTML5.0.

**PRACTICAL:**

Create a web page with the following using HTML

1. To embed an image map in a web page.
2. To fix the hot spots.
3. Show all the related information when the hot spots are clicked

**UNIT - II CASCADING STYLE SHEETS AND CLIENT SIDEPROGRAMMING 15**

**Cascading Style Sheets:** Introduction, Features-Core Syntax, Style Sheets and HTML, Style Rule Cascading and Inheritance, Text Properties, Box Model Normal Flow Box Layout, Beyond the Normal Flow, CSS3.0

**Client Side Scripting:** Scripting basics - Client side and server side scripting, The JavaScript Language, History and Versions, Syntax, JavaScript DOM Model, Variables and Data Types, Statements, Operators, Literals, Functions, Objects, Arrays, Built-in Objects, Verifying forms

**PRACTICAL:**

1. Create a web page with all types of Cascading style sheets
2. Client Side Scripts for Validating Web Form Controls using DHTML.

**UNIT III SERVER SIDE PROGRAMMING 15**

**Host Objects :** Browsers and the DOM, Introduction to the Document Object Mode, DOM History and Levels, Intrinsic Event Handling, Modifying Element Style

**Servlets:** Java Servlet Architecture, Servlet Life Cycle, Form GET and POST actions, Session Handling, Understanding Cookies

**Java Server Page:** Understanding Java Server Pages, Running JSP Applications, Basic JSP, JSP Standard Tag Library (JSTL), Support for the Model-View-Controller Paradigm.

**PRACTICAL:**

1. Installing and Configuring Apache Tomcat Web Server,
2. Write programs in Java using Servlets: To invoke servlets from HTML forms.
3. Creating HTML forms by embedding JSP code

**UNIT - IV PHP & XML 15**

**PHP :** PHP - Working principle of PHP - PHP Variables - Constants - Operators – Flow Control and Looping - Arrays - Strings - Functions - File Handling - PHP and MySQL - PHP and HTML - Cookies -

Simple PHP scripts.

**XML:** XML-Documents and Vocabularies, Versions and Declaration, Namespaces, DOM based XML processing, Event-oriented Parsing-SAX- Document using DOM, XML Formatters, CSSXSLT, XPath, Displaying XML, Documents in Browsers, XML5.

**PRACTICAL:**

1. Database applications using PHP and MySQL
2. Programs using XML – Schema – XSLT/XSL..

**UNIT - V WEB SERVICES**

**15**

**WEB SERVICES:** Need of WS, WS Standards, Java web services Basics – Creating, Publishing, Testing and Describing a Web services (WSDL)-Consuming a web service, SOAP Related Technologies, SOAP- Structure and contents of SOAP Message

**PRACTICAL:**

1. Consider a case where we have two web Services- an airline service and a travel agent and the travel agent is searching for an airline. Implement this scenario using Web Services and Data base.

**TOTAL: 75 PERIODS**

**TEXT BOOKS:**

1. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, Fourth Edition, 2008.
2. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Fourth Edition, Pearson Education, 2007.

**REFERENCES:**

1. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.
2. Marty Hall and Larry Brown, "Core Web Programming", Second Edition, Volume I and II, Pearson Education, 2001.
3. Uttam K. Roy , Web Technologies (Oxford Higher Education), 2010
4. Steven Holzner, —The Complete Reference PHPII, Tata McGraw-Hill, 1st Edition, 2007

Course Name : WEB PROGRAMMING		Course Code : 20IT501			
Co	Course Outcomes	Unit	K-CO	POs	PSOs
C307.1	Understand the web essential concepts and to design simple web pages using markup language.	1	K2	1,2	
C307.2	Understand style properties and able to build dynamic web pages using scripting language.	2	K2	1,2	
C307.3	Build real world applications using client side and server side scripting languages	2	K3	1,2,3	1,2
C307.4	Compare Servlet and JSP concepts and apply JSP concepts to create dynamic web pages by reducing the code complexity and store data in database.	3	K3	1,2,3	1,2
C307.5	Instruction of a web page and relate how PHP and HTML combine to produce the web page	4	K4	1,2,3,4	1,2
C307.6	Understand various web services and how these web services interact.	5	K2	1,2	

**CO PO MAPPING**

CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C307.1	2	1								1				
C307.2	2	1										1		
C307.3	3	2	1							1			1	1
C307.4	3	2	1									1	1	1
C307.5	3	3	2	1						1			1	1
C307.6	2	1								1		1		

**20CS5L1**

**NETWORKS LABORATORY**

L	T	P	C
0	0	4	2

**OBJECTIVES:**

- To learn and use network commands.
- To learn socket programming.
- To implement and analyze various network protocols.
- To learn and use simulation tools.
- To use simulation tools to analyze the performance of various network protocols.

**LIST OF EXPERIMENTS**

1. Learn to use commands like tcp dump, netstat, ifconfig, nslookup and traceroute. Capture ping and trace route PDUs using a network protocol analyzer and examine.
2. Write a HTTP web client program to download a web page using TCP sockets.
3. Applications using TCP sockets like:
  - a) Echo client and echo server
  - b) Chat
  - c) File Transfer
4. Simulation of DNS using UDP sockets.
5. Write a code simulating ARP /RARP protocols.
6. Write a program to implement RPC (Remote Procedure Call)
7. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
8. Study of TCP/UDP performance using Simulation tool.
9. Simulation of error correction code (like CRC).
10. Performance evaluation of Routing protocols using Simulation tool.
11. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer.

- a) Link State routing
- b) Flooding
- c) Distance vector

**TOTAL: 60 PERIODS**

**LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS HARDWARE:**

1. C / C++ / Java / Python / Equivalent Compiler
2. Network simulator like NS2/Glomosim/OPNET/ Packet Tracer / Equivalent
3. Windows 7 or higher

Course Name : NETWORKS LABORATORY										Course Code : 20CS5L1				
Course	Course Outcomes									EXP	K-CO	POs	PSOs	
C308.1	Implement various protocols using TCP and UDP									1-8	K3	1,2,3		
C308.2	Compare the performance of different transport layer protocols									1-8	K4	1,2,3,4		
C308.3	Implement error correction codes									9	K3	1,2,3		
C308.4	Use simulation tools to analyze the performance of various network protocols									7	K4	1,2,3,4	1,2	
C308.5	Evaluate the performance of a network Routing Protocol									10	K3	1,2,3	1,2	
C308.6	Analyze various routing algorithms									11	K4	1,2,3,4	1,2	
CO PO MAPPING														
CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO2
C308.1	3	2	1					2						
C308.2	3	3	2	1				2						
C308.3	3	2	1					2						
C308.4	3	3	2	1				2					1	1
C308.5	3	2	1					2					1	1
C308.6	3	3	2	1				2					1	1

**20CS5L2**

**SOFTWARE ENGINEERING LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**OBJECTIVES:**

- To understand the various basic logic gates
- To design and implement the various combinational circuits
- To design and implement combinational circuits using MSI devices.
- To design and implement sequential circuits
- To understand and code with HDL programming

**LIST OF EXPERIMENTS**

1. Write down the problem statement for a suggested system of relevance.
2. Do requirement analysis and develop Software Requirement Specification Sheet (SRS) for suggested system.
3. Develop Data flow diagram(DFD) model (level-0,level-1) of the project
4. Identify use cases and develop the Use Case model.
5. Identify the conceptual classes and develop a Class Diagram.
6. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and Collaboration Diagrams
7. Draw relevant State Chart and Activity Diagrams for the same system.
8. Implement the system as per the detailed design
9. Test the software system for all the scenarios identified as per the usecase diagram.

**Sample Projects:**

1. Passport automation system.
2. Book bank
3. Exam registration
4. Stock maintenance system.
5. Online course reservation system
6. Airline/Railway reservation system
7. Software personnel management system
8. Library management system
9. e-book management system
10. Student information system

**TOTAL: 60 PERIODS**

**LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS HARDWARE:**

1. Windows 7 or higher
2. Rational Rose Enterprise Edition



Course Name : SOFTWARE ENGINEERING LABORATORY		Course Code : 20CS5L2			
Co	Course Outcomes	EXP	K-CO	POs	PSOs
C309.1	Ability to plan a software engineering process life cycle.	1-4	K3	1,2,3	2
C309.2	Ability to translate end-user requirements into system and software requirements	1-6	K3	1,2,3	2
C309.3	Perform analysis and design for a given problem specification.	1-7	K3	1,2,3	2
C309.4	Identify and map basic software requirements in UML mapping.	6-7	K3	1,2,3	1,2
C309.5	Test the compliance of the software with the SRS.	9	K3	1,2,3	1,2
C309.6	Develop prototype model for a given case study using modern engineering tools.	8-9	K4	1,2,3,4	1,2

**CO PO MAPPING**

CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C309.1	3	2	1					2		2				1
C309.2	3	2	1					2		2				1
C309.3	3	2	1					2		2				1
C309.4	3	2	1					2		2			1	1
C309.5	3	2	1					2		2			1	2
C309.6	3	3	2	1	2			2		2			2	2

**20EC5L3**

**MICROCONTROLLERS & EMBEDDED  
SYSTEMS LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**OBJECTIVES:**

- To introduce ALP concepts, features and Coding methods
- To write ALP for arithmetic and logical operations in 8051
- To differentiate Serial and Parallel Interface
- To interface different I/Os with Microcontroller
- To learn the working of ARM processor
- To write programs to interface memory, I/Os with ARM processor

## LIST OF EXPERIMENTS

### 8051 Programs using kits.

1. Basic arithmetic and Logical operations.
2. Code conversion
3. To find largest number from a given array of 8-bit numbers
4. Interfacing Traffic light controller
5. Interfacing Stepper motor control
6. Interfacing Serial and Parallel ports

### Programming using ARM Processor

1. Study of ARM evaluation system
2. Interfacing ADC and DAC.
3. Interfacing LED and PWM.
4. Interfacing real time clock and serial port.
5. Interfacing keyboard and LCD.

**TOTAL: 60 PERIODS**

### LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS HARDWARE:

1. 8051 Kit
2. Interfacing Modules
3. ARM Development Kit
4. Keil  $\mu$  Vision 5 IDE

Course Name : MICROCONTROLLERS & EMBEDDED SYSTEMS LABORATORY		Course Code : 20EC5L3			
CO	Course Outcomes	EXP	K-CO	POs	PSOs
C310.1	Write ALP Programs for Fixed and Floating point Arithmetic and logical operations using 8051	1	K3	1,2,3	
C310.2	Write ALP Programs for code conversion	2	K3	1,2,3	
C310.3	Interface different I/Os with 8051	3-6	K3	1,2,3	
C310.4	Write programs in ARM for a specific Application	1	K3	1,2,3	2
C310.5	Interface memory, A/D and D/A convertors with ARM system	2-3	K3	1,2,3	2

<b>C310.6</b>	Write programs for interfacing keyboard, display and motor.	4-5	K3	1,2,3	2
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**CO PO MAPPING**

<b>CO ↓</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>C310.1</b>	3	2	1					2						
<b>C310.2</b>	3	2	1					2						
<b>C310.3</b>	3	2	1					2						
<b>C310.4</b>	3	2	1					2						1
<b>C310.5</b>	3	2	1					2						1
<b>C310.6</b>	3	2	1					2						1

**20IT601**

**INTERNET OF THINGS**

**L T P C**  
**3 0 0 3**

**OBJECTIVES:**

- To learn Smart Objects and IOT Architectures
- To learn about various IOT-related protocols
- To build simple IOT Systems using Arduino and Raspberry Pi.
- To learn data analytics and cloud in the context of IOT
- To develop IOT infrastructure for popular applications

**PRE-REQUISITE: NIL**

**UNIT - I FUNDAMENTALS OF IOT 9**

Evolution of Internet of Things – Enabling Technologies – IOT Architectures: oneM2M, IOT World Forum (IOT WF) and Alternative IOT models – Simplified IOT Architecture and Core IOT Functional Stack – Fog, Edge and Cloud in IOT – Functional blocks of an IOT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects - Threats of IOT

**UNIT - II IOT PROTOCOLS 9**

IOT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and Lora WAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IOT: From 6LoWPAN to 6Lo

**UNIT III IOT PROTOCOLS – II AND DEVELOPMENT 9**

Host Objects : Browsers and the DOM, Introduction to the Document Object Mode, DOM History and Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT - IOT system building blocks – Arduino – Board details, IDE programming – Raspberry Pi – Interfaces and Raspberry Pi with Python Programming.

**UNIT - IV DATA ANALYTICS AND SUPPORTING SERVICES 9**

Structured Vs Unstructured Data and Data in Motion Vs Data in Rest – Role of Machine Learning – No SQL Databases – Hadoop Ecosystem – Apache Kafka, Apache Spark – Edge Streaming Analytics and Network Analytics – Xively Cloud for IOT, Python Web Application Framework – Django – AWS for IOT – System Management with NETCONF-YANG

**UNIT - V CASE STUDIES/INDUSTRIAL APPLICATIONS 9**

Cisco IOT system – IBM Watson IOT platform – Manufacturing – Converged Plantwide Ethernet Model (CPwE) – Power Utility Industry – GridBlocks Reference Model – Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, — IOT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017
2. Arshdeep Bahga, Vijay Madisetti, — Internet of Things – A hands-on approach, Universities Press, 2015 Pearson Education, 2007.

**REFERENCES:**

1. Olivier Hersent, David Boswarthick, Omar Elloumi , — The Internet of Things – Key applications and Protocols, Wiley, 2012 .
2. Jan Höller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, — From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence, Elsevier, 2014.
3. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), — Architecting the Internet of Things, Springer, 2011.
4. Michael Margolis, — Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, O'Reilly Media, 2011.

Course Name : INTERNET OF THINGS										Course Code : 20IT601				
CO	Course Outcomes									Unit	K-CO	POs	PSOs	
C311.1	Understand the concept of IOT.									1	K2	1,2		
C311.2	Analyze various protocols for IOT.									2	K2	1,2		
C311.3	Design a PoC of an IOT system using Raspberry Pi/Arduino									3	K3	1,2,3	1.2	
C311.4	Apply data analytics and use cloud offerings related to IOT.									4	K3	1,2,3	1,2	
C311.5	Understand the different IOT systems									5	K2	1,2	1,2	
C311.6	Build applications of IOT in real time scenario									5	K4	1,2,3,4	1,2	
CO PO MAPPING														
CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C311.1	2	1								1				
C311.2	2	1										1		
C311.3	3	2	1							1			1	1
C311.4	3	2	1									1	1	1
C311.5	2	1								1			1	1
C311.6	3	3	2	1								1	1	1

**20IT602**

**MOBILE COMMUNICATION**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- The ability to learn basic concepts of mobile computing
- Get to know about Wireless LAN, Bluetooth and WiFi Technologies
- Be familiar with the network protocol stack
- Learn the basics of mobile telecommunication system
- Be exposed to Ad-Hoc networks

**PRE-REQUISITE:**

Course code: 20CS501

Course Name: Computer Networks

**UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 9**

Introduction to Mobile Computing – Applications of Mobile Computing- Generations of Mobile Communication Technologies-MAC Protocols – SDMA- TDMA- FDMA- CDMA

**UNIT II MOBILE TELECOMMUNICATION SYSTEM 9**

GSM – Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security –GPRS- Architecture and Services- UMTS- Architecture - Handover

**UNIT III WIRELESS NETWORKS 9**

Wireless LANs and PANs – IEEE 802.11 Standard – Architecture – Services – Blue Tooth- Wi-Fi – WiMAX.

**UNIT IV MOBILE NETWORK LAYER 9**

Mobile IP – DHCP – AdHoc– Proactive and Reactive Routing Protocols – Multicast Routing- Vehicular Ad Hoc networks ( VANET) –MANET Vs VANET – Security

**UNIT V MOBILE TRANSPORT AND APPLICATION LAYER 9**

Mobile TCP– Wireless Application Protocol Architecture: Wireless Datagram Protocol – Wireless Transport Layer Security – Wireless Transport Protocol –Wireless Session Protocol – Wireless Application Environment – Wireless Telephony Application Architecture – Wireless Markup Language.

**TOTAL:45PERIODS**

**TEXTBOOKS**

1. Jochen Schiller, —Mobile Communications, PHI, Second Edition, 2003.
2. Prasant Kumar Pattnaik, Rajib Mall, —Fundamentals of Mobile ComputingII, PHI Learning Pvt.Ltd, New Delhi – 2012
3. C.Siva Ram Murthy and B.S.Manoj, —Ad hoc Wireless Networks Architectures and protocolsII,2ndEdition, Pearson Education, 2011

**REFERENCES:**

1. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
2. S Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, —Principles of Mobile ComputingII, Springer, 2003.
3. William.C.Y.Lee,—Mobile Cellular Telecommunications-Analog and Digital SystemsII, Second Edition,Tata Mc Graw Hill Edition ,2006.
4. C.K.Toth, — AdHoc Mobile Wireless NetworksII, First Edition, Pearson Education, 2002.

Course Name : MOBILE COMMUNICATION		Course Code : 20IT602			
CO	Course Outcomes	Unit	K-CO	POs	PSOs
C312.1	Explain the basics of mobile telecommunication system	1	K2	1,2	
C312.2	Illustrate the generations of telecommunication systems in wireless network	2	K2	1,2	2
C312.3	Understand the architecture of Wireless LAN technologies	3	K2	1,2	2
C312.4	Determine the functionality of network layer and Identify a routing protocol for a given Ad hoc networks	4	K2	1,2	
C312.5	Explain the functionality of transport layer	5	K2	1,2	
C312.6	Discuss the application layer concepts	5	K2	1,2	

**CO PO MAPPING**

CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C312.1	2	1								1				
C312.2	2	1										1		1
C312.3	2	1								1				1
C312.4	2	1										1		
C312.5	2	1								1				
C312.6	2	1										1		

20HS501

PRINCIPLES OF MANAGEMENT

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To Study the evolution of Management and organization types
- To Learn the concepts involved in Planning process
- To Explain how organizing is done by manager
- To Learn the importance of Motivation and leadership
- To Detail on directing and controlling in Management

**PREREQUISITE: NIL**

**UNIT - I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9**

Definition of Management – Science or Art – Manager Vs Entrepreneur – types of managers – managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization – Sole proprietorship, partnership, company-public and private sector enterprises – Organization culture and Environment – Current trends and issues in Management. Organization and the environmental factors - managing globally - strategies for international business

**UNIT - II PLANNING 9**

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management - Types of strategies– Planning Tools and Techniques – Decision making steps and process. Rational Decision Making Process – Decision Making under different conditions.

**UNIT III ORGANISING 9**

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design – Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management. Career Development - Career stages – Training - Performance Appraisal

**UNIT - IV DIRECTING 9**

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT. Organization Culture - Elements and types of culture - Managing cultural diversity

**UNIT - V CONTROLLING 9**

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – Cost Control - Purchase Control - Maintenance Control - Quality Control -Planning operations. control and performance – direct and preventive control – reporting.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Stephen P. Robbins & Mary Coulter, —ManagementII, Prentice Hall (India) Pvt. Ltd., 10th Edition, 2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert —ManagementII, Pearson Education, 6<sup>th</sup> Edition, 2004.

**REFERENCES:**

1. Stephen A. Robbins & David A. Decenzo & Mary Coulter, —Fundamentals of Management Pearson Education, 7th Edition, 2011.
2. Robert Kreitner & Mamata Mohapatra, — ManagementII, Biztantra, 2008.
3. Harold Koontz & Heinz Weihrich —Essentials of managementII Tata McGraw Hill, 1998.
4. Tripathy PC & Reddy PN, —Principles of ManagementII, Tata McGraw Hill, 1999



CO	Course Outcomes	Unit	K-CO	POs	PSOs
C313.1	Explain the purpose of management, roles and skills of Manager in local and global organization.	1	K2	1,2	1,2
C313.2	Describe the purpose of planning, decision making and their processes.	2	K2	1,2	1,2
C313.3	Demonstrate the various organizational structures and staff selection procedure.	3	K2	1,2	1,2
C313.4	Classify the motivational theories and communication process.	4	K2	1,2	1,2
C313.5	Describe the scope of control and role of computer, IT in management control.	5	K2	1,2	1,2
C313.6	plain the productivity problem and management	5	K2	1,2	1,2

**CO PO MAPPING**

CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C313.1	2	1										1	1	1
C313.2	2	1								1			1	1
C313.3	2	1										1	1	1
C313.4	3	2	1							1		1	1	1
C313.5	2	1											1	1
C313.6	2	1								1			1	1

20MC601

**ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**

L	T	P	C
1	0	0	0

**OBJECTIVES:**

- Get a knowledge about Indian Culture
- Know Indian Languages, Literature, religion and philosophy and fine arts in India
- Explore the Science and Scientists of Ancient, Medieval and Modern India
- Understand education systems in India

**PRE-REQUISITE: NIL**

**UNIT-I INTRODUCTION TO CULTURE 3**

Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India.

**UNIT-II INDIAN LANGUAGES AND LITERATURE 3**

Indian Languages and Literature – I: Languages and Literature of South India, – Indian Languages and Literature – II: Northern Indian Languages & Literature

**UNIT-III RELIGION AND PHILOSOPHY 3**

Major religions practiced in India and Understanding their Philosophy – religious movements in Modern India (Selected movements only)

**UNIT - IV FINE ARTS IN INDIA (ART, TECHNOLOGY& ENGINEERING) 3**

Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India, development of science in ancient, medieval and modern India

**UNIT - V EDUCATION SYSTEM IN INDIA 3**

Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

**TOTAL: 15 PERIODS**

**REFERENCES:**

1. Kapil Kapoor, "Text and Interpretation: The India Tradition", 2005
2. "Science in Samskrit", Samskrita Bharti Publisher, 2007
3. NCERT, "Position paper on Arts, Music, Dance and Theatre",
4. Narain, "Examinations in ancient India", Arya Book Depot, 1993
5. Satya Prakash, "Founders of Sciences in Ancient India", Vijay Kumar Publisher, 1989
6. M. Hiriyanna, "Essentials of Indian Philosophy", Motilal Banarsidass Publishers, 2014

Course Name : ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE											Course Code : 20MC601			
CO	Course Outcomes										Unit	K –CO	POs	PSOs
C314.1	Explain philosophy of Indian culture.										1	K2	,8,9,10	-
C314.2	Distinguish the Indian languages and literature.										2	K2	,8,9,10	-
C314.3	Explain the philosophy of ancient, medieval and modern India.										3	K2	,8,9,10	-
C314.4	Acquire the information about the fine arts in India.										4	K2	,8,9,10	-
C314.5	plain education systems in India										5	K2	,8,9,10	-
CO-PO Mapping														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C314.1	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C314.2	-	-	-	-	-	2	-	2	2	2	-	-	-	-
C314.3	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C314.4	-	-	-	-	-	2	-	2	2	2	-	-	-	-
C314.5	-	-	-	-	-	3	-	2	2	2	-	-	-	-
C314	-	-	-	-	-	3	-	2	2	2	-	-	-	-

**OBJECTIVES:**

- To understand the need for machine learning for various problem solving
- To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning
- To understand the latest trends in machine learning
- To design appropriate machine learning algorithms for problem solving

**PREREQUISITE: NIL****UNIT - I INTRODUCTION****9**

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

**PRACTICAL****6**

1. Implement data loading methods – understanding data with statistics, visualization - Data Preprocessing - Data Labeling.
2. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

**UNIT - II NEURAL NETWORKS AND GENETIC ALGORITHMS****9**

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

**PRACTICAL****6**

1. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test with appropriate data sets.
2. Construct a Perceptron for training a given data set.

**UNIT III BAYESIAN AND COMPUTATIONAL LEARNING****9**

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

**PRACTICAL****6**

1. Write a program to construct a Bayesian network for any given data set using Python ML library classes.

**UNIT - IV INSTANT BASED LEARNING****9**

K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.

**PRACTICAL****6**

1. Implement K-Nearest Neighbour classification using python.
2. Implement linear regression using python

**UNIT - V      ADVANCED LEARNING****9**

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.

**PRACTICAL****6**

1. Implement the Sequential Covering Algorithm in python.
2. Implement the Q - Learning Algorithm in python.

**TOTAL: 75 PERIODS****TEXT BOOKS:**

1. Tom M. Mitchell, –Machine LearningII, McGraw-Hill Education (India) Private Limited, 2013.

**REFERENCES:**

1. Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning)II, The MIT Press 2004.
2. Stephen Marsland, —Machine Learning: An Algorithmic Perspectivell, CRC Press, 2009.

Course Name : MACHINE LEARNING							Course Code : 20CS604							
CO	Course Outcomes						Unit	K-CO	POs	PSOs				
C315.1	Apply the classification algorithms like candidate elimination, Find-S and Decision tree to predict the hypothesis of the new instance.						1	K3	1,2,3	1,2				
C315.2	Discuss and apply the back propagation algorithm and genetic algorithms to various learning problems.						2	K3	1,2,3	1,2				
C315.3	Demonstrate Bayesian concepts for predicting probabilities in learning methods.						3	K3	1,2,3	1,2				
C315.4	Construct K-NN algorithm for appropriate datasets including discrete-valued and real-valued functions.						4	K3	1,2,3	1,2				
C315.5	Make use of locally weighted regression algorithm to fit any given set of data points.						5	K3	1,2,3	1,2				
C315.6	Apply a reinforcement learning method to make a sequence of decisions in which the agent learns to achieve a goal in an uncertain, potentially complex environment.						5	K3	1,2,3	1,2				
CO PO MAPPING														
CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C315.1	3	2	1									1	1	1
C315.2	3	2	1							1			1	1
C315.3	3	2	1									1	1	1
C315.4	3	2	1							1		1	1	1
C315.5	3	2	1										1	1
C315.6	3	2	1							1			1	1

20IT6L1

## INTERNET OF THINGS LABORATORY

L	T	P	C
0	0	4	2

## OBJECTIVES:

- To learn tools relevant to IoT development.
- To write simple programs that uses various features of the IOT.
- To explore python Programs for IOT & Arduino processors.
- To develop simple applications using Arduino/Raspberry Pi/open platform.
- To design and develop IOT application for real world scenario.

## LIST OF EXPERIMENTS

1. Familiarization of Rasperry Pi/Arduino kit and perform necessary software installation.
2. To Interface LED with Rasperry Pi/Arduino to turn ON LED for 1second after every 2 Seconds.
3. To interface motor with Rasperry Pi/Arduino.
4. To interface sensor with Rasperry Pi/Arduino to print temperature readings.
5. To interface Bluetooth with Rasperry Pi to send sensor data to smartphone using Bluetooth.
6. To interface Bluetooth with Rasperry Pi to turn ON/OFF LED when 1/0 received from smartphone using Bluetooth.
7. To interface WiFi module with Rasperry Pi.
8. To interface camera with Rasperry Pi.
9. To interface IR sensor with Rasperry Pi to read the interference of objects.
10. Hardware Traffic Signal controls using Rasperry Pi.
11. Perform SQL queries with Rasperry Pi.
12. Create Simple web interface for Rasperry Pi.
13. To study of upload temperature data to Thingspeak Cloud using Rasperry Pi.
14. Miniproject

TOTAL: 60 PERIODS

## LAB COMPONENT :

1. Rasperry Pi/Arduino Kit
2. Interfacing Kit

Course Name : INTERNET OF THINGS LABORATORY										Course Code : 20IT6L1				
CO	Course Outcomes										EXP	K-CO	POs	PS Os
C316.1	Write and implement simple programs that use various features of the IOT.										1-5	K3	1,2,3	1,2
C316.2	Write a python Program, debug and interpret the results.											K3	1,2,3	1,2
C316.3	Develop IOT & Arduino based application.										6-9	K3	1,2,3	1,2
C316.4	Test and experiment different sensors for application development.										9-10	K3	1,2,3	1,2
C316.5	Develop IoT applications using Arduino/Raspberry Pi/open platform										11-14	K3	1,2,3	1,2
C316.6	Explore deployment platforms for IoT applications.										10-14	K3	1,2,3	1,2
Co Po Mapping														
CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO1 1	PO1 2	PSO 1	PS O2
C316.1	3	2	1					2					1	1
C316.2	3	2	1					2					1	1
C316.3	3	2	1					2					1	1
C316.4	3	2	1					2					1	1
C316.5	3	2	1					2					1	1
C316.6	3	2	1					2					1	1

20CS6L1

MOBILE APPLICATION DEVELOPMENT  
LABORATORY

L	T	P	C
0	0	4	2

**OBJECTIVES:**

- To understand the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
- To understand how to work with various mobile application development frameworks.
- To learn the basic and important design concepts and issues of development of mobile applications.
- To understand the capabilities and limitations of mobile devices

**LIST OF EXPERIMENTS**

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop an application that draws basic graphical primitives on the screen.
4. Develop an application that makes use of databases.
5. Develop an application that makes use of Notification Manager
6. Implement an application that uses Multi-threading
7. Develop a native application that uses GPS location information
8. Implement an application that writes data to the SD card.
9. Write a mobile application that creates alarm clock
10. Write a mobile application that makes use of RSS feed
11. Develop a mobile application to send an email.
12. Develop a Mobile application for simple needs (Mini Project)

**TOTAL: 60 PERIODS****LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS HARDWARE:**

C / C++ / Java or equivalent compiler GnuPG, Snort, N-Stalker or Equivalent **HARDWARE:**  
Standalone desktops - 30 Nos. (or) Server supporting 30 terminals or more.

Course Name : Mobile Application Development Laboratory										Course Code : 20CS6L1				
CO	Course Outcomes									Unit	K-CO	POs	PS Os	
C317.1	Develop mobile applications using GUI and Layouts.									1	K3	1,2,3		
C317.2	Develop mobile applications using Event Listener.									2	K3	1,2,3		
C317.3	Develop mobile applications using Databases.									3	K3	1,2,3	1,2	
C317.4	Develop an application that uses Multi-threading									4	K3	1,2,3	1, 2	
C317.5	Develop mobile applications using RSS Feed, Internal/External Storage, SMS, Multi- threading and GPS.									5	K3	1,2,3	2	
C317.6	Analyze and discover own mobile app for simple needs									6	K4	1,2,3,4	1,2	
CO PO MAPPING														
CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C317.1	3	2	1					2						1
C317.2	3	2	1					2						1
C317.3	3	2	1					2					1	1
C317.4	3	2	1					2					1	1
C317.5	3	2	1					2						1
C317.6	3	3	2	1				2					1	1

20EE503

**DIGITAL SIGNAL PROCESSING**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**OBJECTIVES:**

To impart knowledge on

- Classification of signals and systems & their mathematical representation.
- Analyse of discrete-time systems using different types of transforms.
- Design of IIR and FIR digital filters using impulse invariant and bilinear transformation techniques and using various window functions.
- Architecture of digital signal processor.

**PRE-REQUISITE:** 20BS301-Transforms and Partial Differential Equations

**UNIT - I INTRODUCTION TO SIGNALS AND SYSTEMS 12**

Classification of signals: Continuous and discrete, energy and power; mathematical representation of signals; operation of signals, Classification of systems: Continuous and discrete, linear, causal, stable, dynamic, recursive, time variance; Spectral density, sampling techniques, quantization, quantization error, Nyquist rate, aliasing effect.

**UNIT – II DISCRETE TIME SYSTEM ANALYSIS 12**

Z-transform and its properties ,ROC- inverse z-transforms -difference equation – Solution by Z-transform, Application to discrete systems - Stability analysis, frequency response- Linear Convolution – Analysis of LTI systems in z-domain.

**UNIT - III DISCRETE FOURIER TRANSFORM & COMPUTATION 12**

DFT- Properties, magnitude and phase representation - Computation of DFT using FFT algorithm – DIT & DIF - FFT using radix 2 – Butterfly structure – Inverse DFT using FFT algorithm, Circular Convolution.

**UNIT - IV DESIGN OF DIGITAL FILTERS 15**

**IIR design:** IIR filter Realization: Direct Form I and II, Cascade and Parallel forms Analog filter design - Butterworth and Chebyshev approximations (LPF and HPF) - Digital filter design using Impulse invariant and Bilinear transformation - Warping, Prewarping.

**FIR design:** FIR filter Realization-Linear Phase Characteristics- Filter design using Windowing Techniques (Rectangular, Hamming, Hanning windows only)

**UNIT - V DIGITAL SIGNAL PROCESSORS 9**

Introduction-Architecture – Features –Addressing Modes – Functional modes-Introduction to Commercial DS Processors -Application: Musical sound processing system.

**TOTAL: 60 PERIODS**



**TEXT BOOKS:**

1. John G. Proakis, D.G. Manolakis and D.Sharma, –Digital Signal Processing Principles, Algorithms and ApplicationsII, 4th edition, Pearson Education, 2012.
2. Salivahanan S, A.Vallavaraj, C.Gnanapriya. —Digital Signal ProcessingII, Tata McGraw Hill/TMH, New Delhi, 2014.

**REFERENCES:**

1. Alan V Oppenheim, Ronald W Schafer, John R Back, —Discrete Time Signal ProcessingII, 3rd edition, Pearson new international edition, 2014.
2. Ramesh Babu. P, — Digital Signal ProcessingII, Scitech Publications of India, 2014.
3. Sanjit K. Mitra, —Digital Signal Processing- A Computer based approach", 4th edition, McGraw-Hill, 2013.
4. Emmanuel C. Ifeachor, —Digital Signal Processing- A Practical ApproachII 2nd edition, Prentice Hall, 2011.
5. JohnnyR.Johnson, —Introduction to Digital Signal ProcessingII, Prentice Hall, 2002.

Course Name : Digital Signal Processing										Course Code : 20EE503				
Co	Course Outcomes									Unit	K-CO	POs	PSOs	
PE1.1	Apply the concept of digital signal processing.									1	K3	1,2,3,10		
PE1.2	Analyze the given discrete time systems using Z-transform.									2	K4	1,2,3,4,12		
PE1.3	Apply FFT algorithm for computing of the given discrete time signals.									3	K3	1,2,3,10		
PE1.4	Design IIR filter using impulse invariant and bilinear transformation techniques for the given specifications.									4	K3	1,2,3,12		
PE1.5	Design FIR filter using windowing techniques (Rectangular, Hamming and Hanning) .for the given specifications.									4	K3	1,2,3,10		
PE1.6	Discuss the architecture of digital signal processors and addressing modes.									5	K2	1,2,12		
CO PO Mapping														
Course outcomes ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PE1.1	3	2	1							1				
PE1.2	3	3	2	1								1		
PE1.3	3	2	1							1				
PE1.4	3	2	1									1		
PE1.5	3	2	1							1				
PE1.6	2	1										1		

<b>20CS6A1</b>	<b>DATA WAREHOUSING AND DATA MINING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To understand data warehouse concepts, architecture, business analysis and tools
- To understand data pre-processing and data visualization techniques
- To study algorithms for finding hidden and interesting patterns in data
- To understand and apply various classification and clustering techniques using tools.

**PRE-REQUISITE:** Nil

**UNIT - I DATA WAREHOUSING, BUSINESS ANALYSIS AND ON-LINE ANALYTICAL PROCESSING (OLAP) 9**

Basic Concepts - Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors - Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies -Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP

**UNIT – II DATA MINING - INTRODUCTION 9**

Introduction– Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns. Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures

**UNIT - III FREQUENT PATTERN ANALYSIS 9**

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns.

**UNIT - IV CLASSIFICATION AND CLUSTERING 9**

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines —Clustering Techniques – Cluster Analysis-Partitioning Methods - Hierarchical Methods – Density Based Methods - Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis

**UNIT - V WEKA TOOL 9**

Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database - Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.

**TOTAL: 60 PERIODS**

**TEXT BOOKS:**

1. Jiawei Han and Micheline Kamber, —Data Mining Concepts and TechniquesII, Third Edition, Elsevier, 2012.

**REFERENCES:**

- 1.Alex Berson and Stephen J.Smith, —Data Warehousing, Data Mining & OLAPII, Tata McGraw – Hill Edition, 35th Reprint 2016.
- 2.K.P. Soman, Shyam Diwakar and V. Ajay, —Insight into Data Mining Theory and Practicell, Eastern Economy Edition, Prentice Hall of India, 2006.
- 3.Ian H.Witten and Eibe Frank, —Data Mining: Practical Machine Learning Tools and TechniquesII, Elsevier, Second Edition.

Course Name : Data Warehousing And Data Mining		Course Code : 20CS6A1			
Co	Course Outcomes	Unit	K-CO	POs	PSOs
PE2.1	Design a Data warehouse system and perform business analysis with OLAP tools.	1	K3	1,2,3,10	2
PE2.2	Apply suitable pre-processing and visualization techniques for data analysis.	2	K3	1,2,3,12	1
PE2.3	Apply frequent pattern and association rule mining techniques.	3	K3	1,2,3,10	1
PE2.4	Apply appropriate classification algorithms.	4	K3	1,2,3,12	2
PE2.5	Apply various clustering techniques.	4	K3	1,2,10	2
PE2.6	Implement learning and clustering algorithms using WEKA tool.	5	K4	1,2,3,4,12	2

**CO PO Mapping**

Course outcomes ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PE2.1	3	2	1							1				1
PE2.2	3	2	1									1	1	
PE2.3	3	2	1							1			1	
PE2.4	3	2	1									1		1
PE2.5	3	2	1							1				1
PE2.6	3	3	2	1		2						1		1

	L	T	P	C
<b>20IT6A1</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**INFORMATION THEORY AND CODING**

**OBJECTIVES:**

- To understand the basics of information theory and coding theories.
- To understand concept of error-detection and error-correction codes, and Viterbidecoding algorithm.
- To understand error control coding Techniques.
- To describe the real world applications based on the fundamental theory.
- To calculate bit error rate, code rate, and steady-state probability.
- To implement convolution code using any program language

**PRE-REQUISITE:**

Course Code: 20BS101

Course Name: Fundamentals of Engineering Mathematics

**UNIT - I INFORMATION THEORY 9**

Information – Entropy, Information rate, classification of codes, Kraft McMillan inequality, Source coding theorem, Shannon-Fano coding, Huffman coding, Extended Huffman coding – Joint and conditional entropies, Mutual information – Discrete memoryless channels – BSC, BEC – Channel capacity, Shannon limit, Concept Hierarchies -Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP

**UNIT – II SOURCE CODING: TEXT, AUDIO AND SPEECH 9**

Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio layers I,II,III, Dolby AC3 – Speech: Channel Vocoder, Linear Predictive Coding

**UNIT - III SOURCE CODING: IMAGE AND VIDEO 9**

Image and Video Formats – GIF, TIFF, SIF, CIF, QCIF – Image compression: READ, JPEG – Video Compression: Principles-I,B,P frames, Motion estimation, Motion compensation, H.261, MPEG standard

**UNIT - IV ERROR CONTROL CODING 9**

Definitions and Principles: Hamming weight, Hamming distance, Minimum distance decoding – Single parity codes, Hamming codes, Repetition codes – Linear block codes, Cyclic codes – Syndrome calculation, Encoder and decoder – CRC

**UNIT - V CONVOLUTIONAL CODES 9**

Convolutional codes – code tree, trellis, state diagram – Encoding – Decoding: Sequential search and Viterbi algorithm – Principle of Turbo coding

**TOTAL: 60 PERIODS**

**TEXT BOOKS:**

1. R Bose, —Information Theory, Coding and Cryptography, TMH 2007
2. Fred Halsall, —Multimedia Communications: Applications, Networks, Protocols and Standards, Pearson Education Asia, 2002

**REFERENCES:**

1. K Sayood, —Introduction to Data Compression, 3/e, Elsevier 2006
2. S Gravano, —Introduction to Error Control Codes, Oxford University Press 2007
3. Amitabha Bhattacharya, —Digital Communication, TMH 2006.

Course Name : Information Theory And Coding		Course Code : 20IT6A1			
CO	Course Outcomes	Unit	K-CO	POs	PSOs
PE3.1	Understand the basics of information and coding theories.	1	K2	1,2,,10	
PE3.2	Compare the various capacity reduction-based coding techniques for text, audio and speech type of data.	2	K4	1,2,3,4,12	
PE3.3	Compare various capacity reduction-based coding techniques for image and video type of data.	3	K4	1,2,3,4,10	
PE3.4	Illustrate various security-oriented coding techniques for Block codes.	4	K3	1,2,3,4,12	
PE3.5	Implement various error control techniques for Convolutional codes	4	K4	1,2,3,4,10	
PE3.6	Understand the basics of information and coding theories.	5	K2	1,2,12	

**CO PO Mapping**

CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PE3.1	2	1								1				
PE3.2	3	3	2	1								1		
PE3.3	3	3	2	1						1				
PE3.4	3	2	1									1		
PE3.5	3	3	2	1						1				
PE3.6	2	1										1		

20IT6A2

**SOFTWARE TESTING**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To introduce the basics and necessity of software testing.
- To provide various testing techniques along with concepts of software bugs and its impact.
- To develop and validate a test plan.
- To build a testing team required.
- To understand the need for and challenges in test automation and to develop testing scripts.
- To introduce the basics and necessity of software testing.

**PRE-REQUISITE:**

Course Code: 20CS502

Course Name: Software Engineering

**UNIT - I TESTING PRINCIPLES AND AXIOMS 9**

Testing as a Process – Testing Axioms –Software Testing Principles – Origins and Cost of Defects – The Tester’s Role in a Software Development Organization-Defect Classes and Examples – Developer/Tester Support of Developing a DefectRepository – Defect Prevention Strategies Operations, OLAP and OLTP.

**UNIT – II BLACK BOX, WHITE BOX TESTING AND TEST ADEQUACY 9**

Test Case Design Strategies – Black Box Approach – Boundary Value Analysis – Equivalence Class Partitioning – State-Based Testing – User Documentation Testing – White Box Approach – Static Testing vs. Structural Testing – Cause effect graphing-Error guessing-Compatibility Testing-Code Functional Testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – Cyclomatic Complexity – Test Adequacy Criteria.

**UNIT - III LEVELS OF TESTING 9**

Unit Test – Planning – Designing the Unit Test Process – Running the Unit Tests and Recording Results – Integration Test Planning – Scenario Testing – Defect Bash Elimination System Testing – Acceptance Testing – Performance Testing – Regression Testing –Internationalization Testing – Ad-Hoc Testing – Alpha, Beta Tests- Usability and Accessibility testing-Configuration Testing- Website Testing

**UNIT - IV TEST MANAGEMENT 9**

Organization Structures For Testing Teams – Testing Services – Test Planning Attachments – Locating Test Items – Test Management – Reporting Test Results – The Role of Three Groups in Test Planning and Policy Development – Introducing the Test Specialist – Skills Needed by a Test Specialist – Building a Testing Group-Agile and DevOps.

**UNIT - V TEST AUTOMATION 9**

Software Test Automation – Design and Architecture for Automation – Requirements for a Test Tool – Testing tools for Automated Software Testing -Challenges in Automation -Test Metrics and Measurements – Project, Progress and Productivity Metrics – Maintenance of Documents During Testing. Identifying and performing various levels of testing for a case study : Online Banking Process, Email Login Process

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Paul C. Jorgensen, —Software Testing: A Craftsman’s Approach, Fourth Edition, CRC Press, 2013.
2. Dorothy Graham, Mark Fewster, —Experiences of Test Automation: Case Studies of Software Test Automation, Pearson Education, 2012.

**REFERENCES:**

1. Glenford J. Myers, Tom Badgett, Corey Sandler, —The Art of Software Testing, Third Edition, John Wiley & Sons, 2012.
2. Srinivasan Desikan, Gopalaswamy Ramesh, —Software Testing – Principles and Practices, Pearson Education, 2009.
3. Boris Beizer, —Software Testing Techniques, Dream Tech Press, 2009.
4. Mauro Pezze, Michal Young, —Software Testing and Analysis Process Principles and Techniques, Wiley India, 2008.
5. Ali Mili, Fairouz Chier, —Software Testing: Concepts and Operations, Wiley, 2015

Course Name : SOFTWARE TESTING										Course Code : 20IT6A2				
Co	Course Outcomes									Unit	K-CO	POs	PSOs	
PE4.1	Gain an insight to software testing.									1	K2	1,2,10	1	
PE4.2	Apply both black box testing and white box testing.									2	K3	1,2,3,12	2	
PE4.3	Understand and apply multiple levels of testing.									3	K2	1,2,10	1	
PE4.4	Understand the role of a tester as an individual and as a team member.									4	K2	1,2,12	1	
PE4.5	Apply software testing for large projects using automated testing tools.									4	K3	1,2,3,10	2	
PE4.6	Maintain documentation on testing.									5	K2	1,2,12		
CO PO Mapping														
Course outcomes ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PE4.1	2	1								1			1	
PE4.2	3	2	1									1		1
PE4.3	2	1								1			1	
PE4.4	2	1										1	1	
PE4.5	3	2	1							1				1
PE4.6	2	1										1		

**20IT6A3**

**INFORMATION STORAGE AND MANAGEMENT**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To understand the basic components of Storage System Environment.
- To understand the Storage Area Network Characteristics and Components.
- To examine emerging technologies including IP-SAN.
- To describe the different backup and recovery topologies and their role in providing disaster recovery and business continuity capabilities.
- To understand the local and remote replication technologies.
- To understand the basic components of Storage System Environment.

**PRE-REQUISITE:**

**Course Code: 20CS402**

**Course Name: Database Management Systems**

**UNIT - I STORAGE SYSTEMS**

**9**

Introduction to Information Storage and Management: Information Storage, Evolution of Storage Technology and Architecture, Data Center Infrastructure, Key Challenges in Managing Information, Information Lifecycle. Storage System Environment: Components of the Host. Hot Spares. Intelligent Storage System: Components, Intelligent Storage Array.

**UNIT – II STORAGE NETWORKING TECHNOLOGIES**

**9**

Direct-Attached Storage and Introduction to SCSI: Types of DAS, DAS Benefits and Limitations, Disk Drive Interfaces, Introduction to Parallel SCSI, SCSI Command Model. Storage Area Networks: Fiber Channel, SAN Evolution, SAN Components, Fiber Channel Connectivity, Fiber Channel Ports, Fiber Channel Architecture, Zoning, Fiber Channel Login Types, Fiber Channel Topologies. Network Attached Storage: Benefits of NAS, NAS File I/Components of NAS, NAS Implementations, NAS-Implementations, NAS File Sharing Protocols, NAS I/O Operations.

**UNIT - III ADVANCED STORAGE NETWORKING AND VIRTUALIZATION**

**9**

IP SAN: iSCSI, FCIP. Content-Addressed Storage: Fixed Content and Archives, Types of Archives, Features and Benefits of CAS, CAS Architecture, Object Storage and Retrieval in CAS, CAS Examples. Storage Virtualization: Forms of Virtualization, NIA Storage Virtualization Taxonomy, Storage Virtualization Configurations, Storage Virtualization Challenges, Types of Storage Virtualization.

**UNIT - IV BUSINESS CONTINUITY**

**9**

Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Lifecycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions. Backup and Recovery: Backup Purpose, Considerations, Granularity, Recovery Considerations, Backup Methods and Process, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Technologies.

**UNIT - V REPLICATION**

**9**

Local Replication: Source and Target, Uses of Local Replicas, Data Consistency, Local Replication Technologies, Restore and Restart Considerations, Creating Multiple Replicas, Management Interface. Remote Replication: Modes of Remote Replication and its Technologies, Network Infrastructure.

**TOTAL: 45 PERIODS**



**TEXT BOOKS:**

1. G. Somasundaram, Alok Shrivastava, —Information Storage and Management: Storing, Managing and Protecting Digital Information, EMC Corporation, Wiley Publication, 2009..

**REFERENCES:**

1. Gerald J. Kowalski, Mark T. Maybury, —Information Storage and Retrieval Systems, Kluwer Academic Publishers, 2002.
2. C. Manning, P. Raghavan and H. Schütze, —Information Retrieval, Cambridge University Press, 2008.
3. Ricardo Baeza, Yates and Berthier Ribeiro Neto, —Modern Information Retrieval: The concepts and technology behind search, Second Edition, ACM Press Books, 2011
5. Ali Mili, Fairouz Chier, —Software Testing: Concepts and Operations, Wiley, 2015

Course Name : Information Storage And Management										Course Code : 20IT6A3				
Co	Course Outcomes									Unit	K-CO	POs	PSOs	
PE5.1	Understand the logical and physical components of a Storage infrastructure.									1	K2	1,2,10		
PE5.2	Analyze the information and intelligent storage system Work with various storage networking technologies									2	K2	1,2,12		
PE5.3	Evaluate storage architectures, including storage subsystems, DAS, SAN, NAS, and CAS.									3	K2	1,2,10		
PE5.4	Understand the various forms and types of Storage Virtualization.									4	K2	1,2,12	2	
PE5.5	Describe the different role in providing disaster recovery and business continuity capabilities.									4	K2	1,2,10	2	
PE5.6	Distinguish different remote replication technologies									5	K2	1,2,12	2	
CO PO Mapping														
Course outcomes ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PE5.1	2	1								1				
PE5.2	2	1										1		
PE5.3	2	1								1				
PE5.4	2	1										1		1
PE5.5	2	1								1				1
PE5.6	2	1										1		1

20IT6A4

**REAL TIME SYSTEMS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To provide good understanding of fundamental concepts in real time systems.
- To provide understanding of advanced topics in real time systems.
- To provide understanding on basic multi-task scheduling algorithms for periodic, a periodic, and sporadic tasks as well as understand the impact of the latter two on scheduling
- To expose to understand capabilities of commercial off-the-shelf R-T kernel.
- To expose to real time communications and databases.

**PRE-REQUISITE:NIL**

**UNIT - I INTRODUCTION 9**

Real-time systems – Applications – Basic Model – Characteristics – Safety and Reliability – Real- Time tasks – Timing Constraints – Modelling Timing Constraints.

**UNIT – II SCHEDULING REAL-TIME TASKS 9**

Concepts – Types of RT Tasks and their Characteristics – Task Scheduling – Clock-Driven Scheduling – Hybrid Schedulers - Event-Driven Scheduling – EDF Scheduling – RMA – Issues with RMA – Issues in Using RMA in Practical Situations

**UNIT - III RESOURCE SHARING AMONG RT TASKS & SCHEDULING RT TASKS 9**

Resource Sharing Among RT Tasks – Priority Inversion – PIP – HLP – PCP – Types of Priority Inversions Under PCP – Features of PCP – Issues in using Resource Sharing Protocol – Handling Task Dependencies – Multiprocessor Task Allocation – Dynamic Allocation of Tasks – Fault-Tolerant Scheduling of Tasks – Clocks in Distributed RT Systems – Centralized and Distributed Clock Synchronization.

**UNIT - IV COMMERCIAL RT OPERATING SYSTEMS 9**

Time Services – Features of RT OS – Unix as a RT OS – Unix Based RT OS – Windows as a RT OS – POSIX – Survey of RTOS: PSOS – VRTX – VxWorks – QNX -  $\mu$ C/OS-II – RT Linux – Lynx – Windows CE – Benchmarking RT Systems.

**UNIT - V RT COMMUNICATION & DATABASES 9**

Examples of Applications Requiring RT Communication – Basic Concepts – RT Communication in a LAN – Soft & Hard RT Communication in a LAN – Bounded Access Protocols for LANs – Performance Comparison – RT Communication Over Packet Switched Networks – QoS Framework – Routing – Resource Reservation – Rate Control – QoS Models - Examples Applications of RT Databases – RT Databases – Characteristics of Temporal Data – Concurrency Control in RT Databases – Commercial RT Databases.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

- 1.Rajib Mall, "Real-Time Systems: Theory and Practice," Pearson, 2008.
- 2.Philip Laplante, —Real-Time Systems Design and Analysis : Tools for the Practitioner:II, 4th Edition, A John Wiley & Sons,2011.

**REFERENCES:**

- 1.Krishna and Shin, "Real-Time Systems," Tata McGraw Hill. 1999.
- 2.Alan C. Shaw, —Real-Time Systems and SoftwareII, Wiley, 2001.
- 3.Jane W. Liu, "Real-Time Systems" Pearson Education, 2001.
- 4.Resource Management in Real-time Systems and Networks, C. Siva Ram Murthy and G. Manimaran, MIT Press, March 2001.

Course Name : REAL TIME SYSTEMS		Course Code : 20IT6A4			
CO	Course Outcomes	Unit	K-CO	POs	PSOs
PE6.1	Understand the basics and importance of real-time systems	1	K2	1,2,10	
PE6.2	Generate a high-level analysis document based on requirements specifications	2	K2	1,2,12	
PE6.3	Generate a high-level design document based on analysis documentation	3	K2	1,2,10	
PE6.4	Generate a test plan based on requirements specification	4	K2	1,2,12	
PE6.5	Generate a validation plan based on all documentation	4	K2	1,2,10	
PE6.6	Understand basic multi-task scheduling algorithms for periodic, aperiodic, and sporadic tasks as well as understand the impact of the latter two on scheduling	2	K2	1,2,12	

**CO PO Mapping**

CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PE6.1	2	1								1				
PE6.2	2	1										1		
PE6.3	2	1								1				
PE6.4	2	1										1		
PE6.5	2	1								1				
PE6.6	2	1										1		

<b>20HS6A3</b>	<b>ENTREPRENEURSHIP TECHNO</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>DEVELOPMENT</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To develop and strengthen entrepreneurial quality and motivation in students.
- To impart basic entrepreneurial skills and understandings to run a business Technical App efficiently and effectively.

**PRE-REQUISITE:NIL**

**UNIT - I ENTREPRENEURIAL COMPETENCE 9**

Entrepreneurship concept – Entrepreneurship as a Career – Entrepreneurial Personality - Characteristics of Successful, Entrepreneur – Knowledge and Skills of Entrepreneur.Case studies of Techpreneurs.

**UNIT – II ENTREPRENEURIAL ENVIRONMENT 9**

Business Tech Environment - Role of Family and Society - Entrepreneurship Development Training and Other Support Organizational Services - Central and State Government Industrial Policies digitalization and Regulations - International Business Technology transfer.

**UNIT - III LAUNCHING OF SMALL BUSINESS TECH APPS 9**

Finance and Human Resource Mobilization Operations Planning - Market and Channel Selection -Growth Strategies - Product Launching Technical Resource– Incubation, Venture capital- joint venture , IT startups.

**UNIT - IV MANAGEMENT OF SMALL BUSINESS 9**

Monitoring and Evaluation of Business - Preventing Sickness and Rehabilitation of Business Units-Effective Management of small Business. Case study of Govt App (e-RUPI, BHIM , UMANG, DigiLocker).

**UNIT - V BUSINESS TECH PLAN PREPARATION 9**

Sources of Product Sector for Business - Prefeasibility Study - Criteria for Selection of Product - Ownership - Capital - Budgeting Project Profile Preparation - Matching entrepreneur with the Project –Feasibility Report Preparation and Evaluation Criteria..

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Drucker, Peter. —Innovation and Entrepreneurship”. United Kingdom, Routledge,2015.
2. Hisrich, —Entrepreneurship”, 9th Edition , Tata McGraw Hill, New Delhi, 2014
3. S.S.Khanka, —Entrepreneurial Development”, S.Chand and Company Limited, New Delhi,(Revised Edition) 2013.

**REFERENCES:**

1. Mathew Manimala, Entrepreneurship Theory at the Crossroads, Paradigms & Praxis, Biztrantra, 2nd Edition ,2005
2. Prasanna Chandra, Projects – Planning, Analysis, Selection, Implementation and Reviews, Tata McGraw-Hill, 1996.
3. P.Saravanavel, Entrepreneurial Development, Ess Pee kay Publishing House, Chennai 1997.
4. Arya Kumar. Entrepreneurship. Pearson, 2012.
5. Donald F Kuratko, T.V Rao. Entrepreneurship: A South Asian perspective. Cengage, 2012

Course Name : Entrepreneurship Technopreneurship Development										Course Code : 20HS6A3				
COo	Course Outcomes									Unit	K-CO	POs	PSOs	
PE7.1	in knowledge and skills needed to run a business start-ups									1	K2	1,2,10		
PE7.2	Upgrade the professional and managerial skills in Digitalization specifications									2	K2	1,2,12		
PE7.3	Understand The Small Business Tech Apps Launching									3	K2	1,2,10		
PE7.4	Learn the Effective Management of small Business									4	K2	1,2,12		
PE7.5	Implement the small business app									4	K2	1,2,10		
PE7.6	Learn the Business Tech Plan Preparation									5	K2	1,2,12		
CO PO Mapping														
CO ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PE7.1	2	1								1				
PE7.2	2	1										1		
PE7.3	2	1								1				
PE7.4	2	1										1		
PE7.5	2	1								1				
PE7.6	2	1										1		



**K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM**  
(An Autonomous Institution, Affiliated to Anna University, Chennai)



**B.TECH.INFORMATION TECHNOLOGY**

**V SEMESTER**

**OPEN ELECTIVE – I (V SEMESTER)**

<b>20OE501</b>	<b>PRINCIPLES OF SOFTWARE TESTING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To introduce basic principles and practices of software testing.
- To explore various testing techniques along with concepts of software bugs and its impact.
- To write test plan and validate.
- To be familiar with test management process.
- To understand the need for and challenges in test automation and to develop test scripts.

**PRE-REQUISITE:** Nil

<b>UNIT I</b>	<b>INTRODUCTION</b>	<b>9</b>
Testing as an Engineering Activity –Software Testing Principles – The Tester’s Role in a Software Development Organization – Origins of Defects – Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer/Tester Support for Developing a Defect Repository.		
<b>UNIT II</b>	<b>TEST CASE DESIGN</b>	<b>9</b>
Introduction to Testing Design Strategies – The Smarter Tester – Test Case Design Strategies – Using Black Box Approach to Test Case Design Random Testing – Boundary Value Analysis - Equivalence Class Partitioning state-based testing– cause effect graphing – error guessing - compatibility testing –user documentation testing – domain testing– Test Adequacy Criteria –static testing vs. structural testing – code functional testing		
<b>UNIT III</b>	<b>LEVELS OF TESTING</b>	<b>9</b>
The Need for Levels of Testing – Unit Test – Unit Test Planning –Designing the Unit Tests. The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – scenario testing – defect bash elimination -System Testing – types of system testing - Acceptance testing - performance testing - Regression Testing – internationalization testing – ad-hoc testing - Alpha – Beta Tests		
<b>UNIT IV</b>	<b>TEST MANAGEMENT</b>	<b>9</b>
People and organizational issues in testing – organization structures for testing teams – testing services - Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process - Reporting Test Results – The role of three groups in Test Planning and Policy Development – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.		
<b>UNIT V</b>	<b>CONTROLLING AND MONITORING</b>	<b>9</b>
Software test automation – skills needed for automation – scope of automation –requirements for a test tool – challenges in automation - Test metrics and measurements –project, progress and productivity metrics – Status Meetings – Reports and Control Issues – Criteria for Test Completion – SCM – Types of reviews – Developing a review program – Components of Review Plans– Reporting Review Results. – evaluating software quality – defect prevention – testing maturity model		

**TOTAL: 45 PERIODS**

**TEXT BOOKS :**

1. Paul C. Jorgensen, —Software Testing: A Craftsman’s Approach, Fourth Edition, CRC Press, 2013.
2. Srinivasan Desikan and Gopaldaswamy Ramesh, — Software Testing – Principles and Practices, Pearson education, 2006.
3. Aditya P.Mathur, —Foundations of Software Testing, Pearson Education,2008.

**REFERENCES:**

1. Boris Beizer, —Software Testing Techniques, Second Edition, Dreamtech, 2003
2. Elfriede Dustin, —Effective Software Testing, First Edition, Pearson Education, 2003.
3. Renu Rajani, Pradeep Oak, —Software Testing – Effective Methods, Tools and Techniques, Tata McGraw Hill, 2004.

Course Name : Principles Of Software Testing											Course Code : 20OE501			
Co	Course Outcomes										Unit	K-CO	POs	PSOs
OE1.1	scribe the key techniques and processes involved in software testing.										1	K2	1,2,10	
OE1.2	nstruct white-box and black-box test cases using test generation methods like cyclomatic complexity and Finite State Machines.										2	K2	1,2,12	
OE1.3	termine adequacy for a given test suite using control flow, data flow, and program mutations										3	K2	1,2,10	
OE1.4	scribe different levels of testing and their significances										4	K2	1,2,12	2
OE1.5	plain the test management activities like test planning, creating teams, generating reports, skills identification for test operations etc.										4	K2	1,2,10	
OE1.6	plain the test metrics and need for automated testing										5	K2	1,2,12	2
CO PO Mapping														
Course outcomes ↓	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO8	PO 9	PO1 0	PO1 1	PO12	PSO1	PSO 2
OE1.1	2	1								1				
OE1.2	2	1										1		
OE1.3	2	1								1				
OE1.4	2	1										1		1
OE1.5	2	1								1				
OE1.6	2	1										1		1

**20OE502 FUNDAMENTALS OF WEB TECHNOLOGY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To understand the technologies used in Web Programming
- To learn more about markup languages like HTML and XHTML
- List various tags in html and use these, apply Cascaded style sheet to create web page.
- To design and implement static and dynamic website
- To understand various web services and how these web services interact

**PRE-REQUISITE:** Nil**UNIT I WEB ESSENTIALS AND MARK-UP LANGUAGES 9**

**Web Essentials:** Web browser architecture, The Internet, Basic Internet Protocols, The World Wide Web, HTTP request message-response message, Web Clients Web Servers

**Mark-up Languages:** An Introduction to HTML, History-Versions, Fundamental HTML Elements, Syntax and semantics, Basic Tags, Headers, Linking, List, Tables, Images, Forms, Frames, HTML5.0.

**UNIT II CASCADING STYLE SHEETS 9**

Introduction, Features-Core Syntax, Style Sheets and HTML, Style Rule- Inline Styles – Embedding Style Sheets - Linking External Style Sheets – Backgrounds – Cascading and Inheritance, Text Properties, Margins and Padding - Positioning using CSS -Box Model Normal Flow Box Layout, Beyond the Normal Flow, CSS3.0.

**UNIT III JAVA SCRIPT 9**

An introduction to JavaScript–JavaScript DOM Model-Date and Objects,-Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript- JSON introduction – Syntax –Function Files – Http Request – SQL

**UNIT IV PHP 9**

PHP - Working principle of PHP - PHP Variables - Program control- Built-in functions- Constants - Operators –Flow Control and Looping - Arrays - Strings - Functions - File Handling - PHP and MySQL - PHP and HTML - Cookies - Simple PHP scripts.

**UNIT V XML 9**

XML-Benefits-Advantages of XML over HTML-XML based Standards-Documents and Vocabularies, Versions and Declaration, Namespaces, XML Schemas-DOM based XML processing, Event-oriented Parsing- SAX- Document using DOM, XML Formatters, CSSXSLT, XPath, XSLT,XQ,Displaying XML, Documents in Browsers, XML5.

**TOTAL: 45 PERIODS****TEXT BOOKS :**

Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, Fourth Edition, 2008.

**REFERENCES:**

1. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition,PearsonEducation, 2007.
  2. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.
  - 3.Marty Hall and Larry Brown,||Core Web Programming||, Second Edition, Volume I and II, Pearson Education, 2001.
- ates, —Developing Web Applications||, Wiley, 2006.



Course Name : Fundamentals Of Web Technology		Course Code : 20OE502			
Co	Course Outcomes	Unit	K-CO	POs	PS Os
OE2.1	Understand web essential concepts and to design simple web pages using markup language.	1	K2	1,2,10	
OE2.2	Ability to use technologies of Web Programming	2	K2	1,2,12	
OE2.3	Understand style properties and able to build dynamic web pages using scripting language.	3	K2	1,2,10	
OE2.4	Ability to build real world applications using client side and server side scripting languages	4	K4	1,2,3,4,12	1,2
OE2.5	Distinguish PHP as a server side programming language	4	K4	1,2,3,4,10	1,2
OE2.6	Represent web data using XML and develop web pages using JSP.	5	K3	1,2,3,12	1,2

**CO PO Mapping**

Course outcomes ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
OE2.1	2	1								1				
OE2.2	2	1										1		
OE2.3	2	1								1				
OE2.4	3	3	2	1								1	1	1
OE2.5	3	3	2	1						1			1	1
OE2.6	3	2	1									1	1	1

**200E503 INTERNET OF THINGS & ITS APPLICATIONS**

**L T P C**  
**3 0 0 3**

**OBJECTIVES:**

- To learn Smart Objects and IOT Architectures
- To learn about various IOT-related protocols
- To build simple IOT Systems using Arduino and Raspberry Pi.
- To learn data analytics and cloud in the context of IOT
- To develop IOT infrastructure for popular applications

**PRE-REQUISITE:** Nil

<b>UNIT I</b>	<b>FUNDAMENTALS OF IOT</b>	<b>9</b>
Evolution of Internet of Things – Enabling Technologies – IOT Architectures: oneM2M, Simplified IOT Architecture , Cloud in IOT – Functional blocks of an IOT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects - Threats of IOT		
<b>UNIT II</b>	<b>IOT PROTOCOLS</b>	<b>9</b>
IOT Access Technologies: Physical and MAC layers, topology, Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IOT, Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT		
<b>UNIT III</b>	<b>DEVELOPMENT AND CASE STUDIES</b>	<b>9</b>
IOT system building blocks – Arduino – Board details, Raspberry Pi with Python Programming - Cisco IOT system – IBM Watson IOT platform - Power Utility Industry – GridBlocks Reference Model		
<b>UNIT IV</b>	<b>RASPBERRY PI/ARDUINO INTERFACING</b>	<b>9</b>
Interface LED with Raspberry Pi/Arduino - Interface motor with Raspberry Pi/Arduino - Interface sensor with Raspberry Pi/Arduino - Interface Bluetooth with Raspberry Pi – Interface WiFi Module Raspberry Pi – Interface camera with Raspberry Pi – Interface IR sensor		
<b>UNIT V</b>	<b>CASE STUDIES/INDUSTRIAL APPLICATIONS</b>	<b>9</b>
Smart and Connected Cities: Street Layer, City layer, Data Center Layer and Services Layer, Smart Lighting, Smart Parking Architecture and Smart Traffic Control - Smart Transportation – Connected Cars.		

**TOTAL: 45 PERIODS**

**TEXT BOOKS :**

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, — —IOT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of ThingsII, Cisco Press, 2017
- Arshdeep Bahga, Vijay Madisetti, —IIInternet of Things – A hands-on approachII, Universities Press, 2015

**REFERENCES:**

- 1.Olivier Hersent, David Boswarthick, Omar Elloumi , —IIThe Internet of Things – Key applications and ProtocolsII, Wiley, 2012 (for Unit 2).
- 2.Jan Ho“ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, —From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligencell, Elsevier, 2014.
- 3.Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —IIArchitecting the Internet of ThingsII, Springer, 2011.
- Michael Margolis, —Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your ProjectsII, 2nd Edition, O’Reilly Media, 2011.

Course Name : Internet Of Things & Its Applications										Course Code : 20OE503				
Co	Course Outcomes									Unit	K-CO	POs	PS Os	
OE3.1	Explain the concept of IOT.									1	K2	1,2,10		
OE3.2	Analyze various protocols for IOT.									2	K2	1,2,12		
OE3.3	Explain the development board of Raspberry Pi/Arduino									3	K2	1,2,3,10	1.2	
OE3.4	Apply data analytics and use cloud offerings related to IOT.									4	K3	1,2,3,12	1,2	
OE3.5	Analyze the different IOT systems									4	K3	1,2,10	1,2	
OE3.6	Analyze applications of IOT in real time scenario									5	K4	1,2,3,4,12	1,2	
CO PO Mapping														
Course outcomes ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
OE3.1	2	1								1				
OE3.2	2	1										1		
OE3.3	2	1								1			1	1
OE3.4	3	2	1									1	1	1
OE3.5	3	2	1							1			1	1
OE3.6	3	3	2	1								1	1	1

200E504

**CYBER SECURITY**

**L T P C**  
**3 0 0 3**

**OBJECTIVES:**

- To introduce the basic concepts and challenges in Cyber Security.
- To explore the security threats and attacks in Operating System and Networks.
- To analyze the Security Countermeasures to defend and resolve the security issues.
- To acquire the knowledge of Cyberspace Privacy.
- To implement the cyber security principles and methods in organization.

**PRE-REQUISITE:** Nil

<b>UNIT I</b>	<b>INTRODUCTION TO CYBER SECURITY</b>	<b>9</b>
Introduction -Computer Security - Threats -Harm - Vulnerabilities - Controls - Authentication - Access Control and Cryptography - Web—User Side - Browser Attacks - Web Attacks Targeting Users - Obtaining User or Website Data - Email Attacks		
<b>UNIT II</b>	<b>SECURITY IN OPERATING SYSTEM &amp; NETWORKS</b>	<b>9</b>
Security in Operating Systems - Security in the Design of Operating Systems -Rootkit - Network security attack- Threats to Network Communications - Wireless Network Security - Denial of Service - Distributed Denial-of-Service – SQL Injection.		
<b>UNIT III</b>	<b>DEFENCES: SECURITY COUNTERMEASURES</b>	<b>9</b>
Cryptography in Network Security - Firewalls – Memory Forensics - Honey Pots -Intrusion Detection and Prevention Systems - Network Management - Databases - Security Requirements of Databases - Reliability and Integrity - Database Disclosure - Data Mining and Big Data.		
<b>UNIT IV</b>	<b>PRIVACY IN CYBERSPACE</b>	<b>9</b>
Privacy Concepts -Privacy Principles and Policies -Authentication and Privacy - Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies - Where the Field Is Headed. Case Study : Aadhaar – Banking – Credit Cards.		
<b>UNIT V</b>	<b>MANAGEMENT AND INCIDENTS</b>	<b>9</b>
Data Theft – Detecting Insider Attacks – The Naïve Bayes Approach - Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster - Emerging Technologies - The Internet of Things - Cyber Warfare- Cyberspace and the Law - International Laws - Cyber Crime - Cyber Warfare		

**TOTAL: 45 PERIODS**

**TEXT BOOKS :**

- Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, —Security in Computingll, 5th Edition , Pearson Education , 2015
- James Graham, Richard Howard, and Ryan Olson (Eds), “Cyber Security Essentials”, CRC Press, 2011.
- George K.Kostopoulos, —Cyber Space and Cyber Security”, CRC Press, 2013.

**REFERENCES:**

- Salvator J.Stolfo, Steven M.Bellovin, Shlomo Hershkop, Angelos D. Keromytis, Sara Sinclair, and Sean W.Smith (Eds), “Insider Attack and Cyber Security: Beyond the Hacker”, Springer, 2008
- Martti Lehto, Pekka Neittaanmäki, —Cyber Security: Analytics,Technology and Automation” edited, Springer International Publishing Switzerland , 2015.
- Jelson Phillips and Enfinger Steuart, — —Computer Forensics and Investigationsll, Cengage Learning, New Delhi, 2009.
- Jilakshi Jain, Ramesh Menon, —Cyber Security and Cyber Lawsl, Willey, 2020.

Course Name : Cyber Security		Course Code : 20OE504			
Co	Course Outcomes	Unit	K-CO	POs	PSOs
OE4.1	strate the Cyber Security challenges.	1	K2	1,2,10	
OE4.2	alyze the security issues in Operating System and Networks	2	K2	1,2,12	
OE4.3	ntify the remedial measures taken for preventing security attacks.	3	K2	1,2,3,10	1,2
OE4.4	Evaluate threats in order to protect or defend it in Cyberspace from Cyber-attacks.	4	K3	1,2,3,12	1,2
OE4.5	plement the process of cyber security systems in the organizations.	4	K3	1,2,10	1,2
OE4.6	alyze applications of Security in real time scenario	5	K4	1,2,3,4,12	1,2

**CO PO Mapping**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
OE3.1	2	1								1				
OE3.2	2	1										1		
OE3.3	2	1								1			1	1
OE3.4	3	2	1									1	1	1
OE3.5	3	2	1							1			1	1
OE3.6	3	3	2	1								1	1	1