

National Forensic Sciences University

An Institution of National Importance
(Ministry of Home Affairs, Government of India)
Sector – 9, Gandhinagar, Gujarat – 382007



School of Cyber Security & Digital Forensics

B. Tech. – M. Tech. Computer Science and
Engineering (Cyber Security)

(Syllabus, Teaching & Examination Schemes)

(W.E.F. Academic Year 2021 -22)

SEMESTER – I

CTBTCSE SI P1: Engineering Physics

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 2 | 0 | 0 | 2 | 2 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

* Note: TA-2 will be in form of assignments or workshops.

Objectives

1. To help students learn basic principles of physics.
2. To help students learn basic laws and principles of motions and forces.
3. To study and understand concepts of waves and reflection.
4. To study the concepts of radioactivity, nuclear fission and fusion.

Unit 1

Laws of Motion

Motion and its physical interpretation. Newton's law of motion, Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces. Static and kinetic friction, laws of friction, rolling friction, lubrication. Circular motion: Centripetal and Centrifugal force, examples of circular motion, Projectile motions and its application.

Unit 2

Nature and Properties of Wave Optics

Definition of wave and wave motion. Difference between longitudinal and transverse waves. Nature and properties of electromagnetic waves. Reflection, refraction polarization and diffraction of light. Refractive index and total internal reflection of light. Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers. Physical and Chromatic aberrations. Propagation of sound wave and their properties.

Unit 3

Nuclear Physics

Structure of atom. Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum. Composition and size of nucleus, atomic masses, isotopes, isobars; isotones. Radioactivity – alpha, beta and gamma particles/rays and their properties; radioactive decay law. Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number; nuclear fission and fusion.

References Books

1. Sears and Zemansky, University Physics, Pearson Publication
2. Paul G Hewitt Conceptual Physics Pearson Publication
3. NCERT Physics Part 1 And 2 NCERT
4. Gomber & Gogia Fundamentals of Physics Pradeep Publications, Jalandhar
5. Arvind Kumar & Shrish Barve, How and Why in Basic Mechanics Universities Press

CTBTCSE SI P2: Engineering Mathematics – 1

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 3 | 1 | 0 | 4 | 4 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To learn the concept of higher order derivatives and Partial derivatives
2. To derive series expansion of some standard functions
3. Learn to trace the curves: Cartesian and polar
4. To learn concept of Matrix Algebra and apply it to find solution of system of Linear Equations and eigen value problems and to learn algebra of Complex numbers

Unit 1

Successive Differentiation

Higher order derivatives and some problems based on it. Some standard results on nth derivative and problems based on it. Leibnitz's theorem and problems based on it.

Unit 2

Expansion & Indeterminate Forms

Maclaurin's theorem and problems based on it. Taylor's theorem and problems based on it, Review of limit, L- Hospital's rule, Indeterminate forms $\frac{0}{0}, \frac{\infty}{\infty}, 0 \times \infty, \infty - \infty, 0^0, 1^\infty$

Unit 3

Partial Differentiation & its applications

Limit, Continuity of functions of several variables, Partial derivatives, Total Derivative, Homogeneous Functions, Euler's theorem, Differentiation of implicit functions, Jacobian, error and approximation, maxima and minima

Unit 4

Complex Numbers

Algebra of complex numbers, Modulus, Arguments, Polar Form, De' Moivre's theorem, Expansion of $\cos n\theta$, $\sin n\theta$, in powers of $\cos\theta$ and $\sin\theta$, Roots of complex

numbers, Solutions of Quadratic equations, Circular functions, Hyperbolic functions, Relation between circular and hyperbolic functions, logarithm of a complex number.

Unit 5

Matrices

Types of Matrices, Elementary row operation, Rank of a matrix, Normal form, Consistency of system of simultaneous linear equations, Inverse of a matrix by Gauss Jordan method, linearly dependent and independent vectors, Eigen values and eigen vectors, Cayley Hamilton theorem.

References Books

1. E. Kreyszig, Advanced Engineering Mathematics (8th Edition), Wiley-India (1999).
2. Higher Engineering Mathematics, Thirty-fifth edition. B. S. Grewal, Khanna Publication.
3. Higher Engineering Mathematics – Vol. 1, Dr. K. R. Kachot, Mahajan Publ. house
4. Thomas' Calculus, Maurice D. Weir, Joel Hass, Frank R. Giordano, Person Education.
5. Calculus, James Stewart, Thomson (5th Edition, 2003).
6. T. M. Apostol, Calculus, Volumes 1 and 2 (2nd Edition), Wiley Eastern (1980).

CTBTCSE SI P3 : Basics of Electrical Engineering

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 2 | 1 | 0 | 3 | 3 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To acquaint the students in fundamental concepts of Electrical Engineering, which includes various Engineering Standards, Basic Elements of Circuits and its properties, Basic of Energy Conversion, Various fundamentals and Laws governing the phenomena of Electromagnetism and Electrostatics.
2. To impart training to the students in order to enable them to understand, analyze and evaluate various aspects of basic D.C. as well and A.C. Circuits.
3. To acquaint the students in various fundamentals and Laws governing the phenomena of Electromagnetism and Electrostatics.
4. To lay foundation stone to study the advance concepts of Electrical Engineering and would also be useful in day-to-day application.

Unit 1

Fundamental and Basic Circuit Element

Concepts of E.M.F., Potential Difference and current, Resistance and Resistors, effect of temperature on resistance, resistance temperature coefficient, resistors in series and parallel, S.I. units of work, power and energy.

Unit 2

Electromagnetism

Magnetic effect of an electric current, cross and dot conventions, right hand thumb rule and cork screw rule, nature of magnetic field of long straight conductor, solenoid and toroid. Concept of m.m.f., flux, flux density, reluctance, permeability and field strength, their units and relationships. Simple series and parallel magnetic circuits, comparison of electrical and magnetic circuit, force on current carrying conductors placed in magnetic field, Fleming's left-hand rule. Faradays laws of electromagnetic induction, statically and dynamically induced E.M.F., self and mutual inductance, coefficient of couplings. Energy stored in magnetic field. Charging and discharging of inductor and time constant.

Unit 3

Electrostatics

Electrostatics field, electric flux density, electric field strength, absolute permittivity, relative permittivity, capacitance and capacitor, composite dielectric capacitors, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors and time constant.

Unit 4

D.C. Circuits & AC Fundamentals

Classification of electrical networks, Ohm's law, Kirchhoff's law and their applications for network solutions. Simplifications of networks using series and parallel combinations and star-delta conversions, Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of instantaneous, peak (maximum), average and R.M.S. values, frequency, cycle, period, peak factor and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasors.

Unit 5

AC Circuits

Single Phase AC Circuit: Study of A.C. circuits consisting of pure resistance, pure inductance, pure capacitance and corresponding voltage-current phasor diagrams and waveforms. Development of concept of reactance, study of series R-L, R-C, R-L-C circuit and resonance, study of parallel R-L, R-C and R-LC circuit, concept of impedance, admittance, conductance and susceptance in case of above combinations and relevant voltage-current phasor diagrams, concept of active, reactive and apparent power and power factor. Single Phase Power Measurement.

Poly-Phase AC Circuit: Poly phase A.C. Circuits: Concept of three-phase supply and phase sequence. Voltages, currents and power relations in three phase balanced star-connected loads and delta-connected loads along with phasor diagrams. Three Phase Power Measurement.

References Books

1. Electrical Technology Vol.1, B.L.Theraja, S.Chand Publication, New Delhi
2. Basic Electrical Engineering, V.N.Mittal, TMH Publication, New Delhi
3. Basic Electrical Engineering, V.K.Mehta, S.Chand and Company Ltd., New Delhi
4. Electrical Technology, Edward Hughes, Seventh Edition, Pearson Education
5. Elements of Electrical Technology, H.Cotton, C.B.S. Publications
6. Basic Circuits Analysis, John Omalley Shawn, Mc Graw Hill.
7. Principles of Electrical Engineering, Del. Toro, PHI

CTBTCSE SI P4 : Fundamentals in Computer Programming with C

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|---------|-------|-----|------------------|-----|------------------------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 3 | 0 | 0 | 3 | 3 | 25 | 45 Mins | 50 | 1.5 | 100 | 3 | - | - | 200 |

Objectives

1. To provide an entry-level computer programming concept.
2. To develop the Logical and programming ability in students.
3. To improve their proficiency in applying the computing fundamentals to their field of study.
4. To provide a logical base to high level programming languages.

Unit 1

Fundamentals of Computer

What is computer? History of computer, Block diagram of computer system, Hardware and software, Overview of types of operating systems, Compiler and interpreter, Programming Languages, Flowchart and Algorithm.

Unit 2

Overview of C

History of C, Features of C, Basic structure of C program, Process of executing a C program, Character set, trigraph sequences, C tokens, Data type, Variable, Storage class, Symbolic Constant, Overflow of data, Operators, Operator Precedence and Associativity, Type conversions, I/O Functions.

Unit 3

Branching & Looping statements

Introduction, if statement, types of if statement, switch statement, while statement, for statement, do-while statement, go to statement, break and continue statement

Unit 4

Array & Structure

Introduction, One-dimensional array, Two-dimensional array, multidimensional array, limitation of array, strings, string handling functions, table of string, defining a structure, declare and accessing structure variable, structure member as array, structure variable as array, structure within structure, unions, bit fields.

Unit 5

Pointers and User Defined Functions

Introduction, advantages, declaration of pointers, chain of pointers, scale factor, pointers and arrays, pointers and structures, Advantages of functions, elements of functions, categories of functions, recursion, function and arrays, functions and structure, functions and pointers.

References Books

1. Programming in ANSI C, E. Balagurusamy, PHI
2. Let us C, Yaswant Kantikar, BPB
3. C: The Complete Reference, Herbert Schildt, McGrawHill
4. Computer concepts and Programming, Vikas Gupta, DreamTech
5. Computer fundamentals and Programming in C, Pradip dey and Manas Ghosh, Oxford.

CTBTCSE SI P5: Engineering Graphics

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|---------|-------|-----|------------------|-----|------------------------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 2 | 0 | 0 | 2 | 2 | 25 | 45 Mins | 50 | 1.5 | 100 | 3 | - | - | 200 |

Objectives

1. To allow and help students visualize the objects.
2. To allow and help students understanding and read drawing.
3. To allow and help students to draw and present their drawing.
4. To allow and help students in understanding 3D Projections.

Unit 1

Introduction & Geometric Constructions

Introduction: Drawing instruments & accessories, drawing layout and lettering, drawing conventions and dimensioning rules, geometric constructions, BIS, representative fraction. **Types of graphical scales:** (plain scale, diagonal scale, Vernier scale, comparative scale, scale of chords). **Engineering curves classifications and application:** [parabola, ellipse, hyperbola, cycloidal curves: (spirals, roulettes, trochoids, involutes)]

Unit 2

Projection of points & lines

Basics of projection theory: Principals of projection, Projection methods (1st & 3rd angle), Planes of projections, Symbols for method of projection, **Projection of points:** Introduction, Projection in quadrants, **Projection of lines:** Introduction, Inclined to HP and VP, True length & inclinations, Traces of lines

Unit 3

Projection of planes & solids

Projection of planes: Introduction, Types of planes, Projections of a Plane surface & its examples (A. perpendicular to both the reference planes, B: Perpendicular to one plane and parallel to another plane, C: Perpendicular to one plane and inclined to the other plane, D: Inclined to both planes)

Unit 4

Projection & Section of solids

Projection of solids: Introduction, Types of solids, Projection of solids (Cylinder, Cone, Pyramid and Prism), **Sections of Solids:** Introduction, Sections of Solids, A: Section plane parallel to VP, B: Section plane parallel to HP, C: Section plane perpendicular to HP and inclined to VP, D: Section plane perpendicular to VP and inclined to HP, Intersections of solids, Methods of Intersection, Development of Surfaces, Methods of development, True shape of the section

Unit 5

Orthographic & Isometric Projections

Isometric Projection: Introduction, Classifications, Types of projection, 1st angle projection, 3rd angle projection, Projection of points, lines & planes, Isometric axes, Lines & planes, Isometric scale, Isometric projection and Isometric view, Conversion of Isometric to Orthographic Projections

References Books

1. Engineering drawing NSQF, Directorate General of Training, Ministry of Skill Development & Entrepreneurship, Government of India.
2. Dhananjay A Jolhe, Engineering Drawing, Tata McGraw Hill.
3. M.B. Shah and B.C. Rana, Engineering Drawing, Pearson Education.
4. K. Venugopal, Engineering Drawing and Graphics, New Age International (P) Ltd., publishers.
5. N.D. Bhatt and V.M. Panchal, Engineering Drawing, Charotar Publishing house.
6. Engineering Graphics, P.J.Shah, S.Chand & Company Ltd., New Delhi
7. Engineering Drawing, P.S.Gill, S.K.Kataria & sons, Delhi
8. Engineering Drawing, B. Agrawal and C M Agrawal, Tata McGraw Hill, New Delhi

CTBTCSE SI P6: Communication Skills

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 2 | 1 | 0 | 3 | 3 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. Communicate across the cultures in professional groups and develop their critical listening skills.
2. Improve their competences in professional writing. Use grammar & vocabulary in correct and appropriate manner.
3. Articulate different sounds in effective ways.
4. Improve their speaking skills in day-to-day life.

Unit 1

Basic Fundamentals of Communication

Meaning, definition, objectives & Characteristics /nature of Communication, Communication Process, flow of Communication, Introduction to Professional Communication, Principles of Professional Communication, Communication Networks, Informal Communication

Unit 2

Non-Verbal Communication

Introduction, Components of NVC - Proxemics, Haptics, Kinesics, Chronemics, Paralinguistic Features, Other NVC, Importance of NVC in oral communication,

Listening Skills: Hearing v/s Listening, Types & Barriers of Listening, Active v/s Passive Listening, Traits of a good listener

Unit 3:

Writing Skills

Paragraph Development: What is Paragraph? Components of Paragraph – Unity, Topic Sentence, Cohesion, Coherence, Adequate Development, Approaches of Paragraph – Inductive, Deductive & Expository Approach, Types of Paragraph, Attributes of good paragraph, Use of Transitional Words, **Business & Technical**

Letter Writing: Introduction to Letter Writing, Informal Letters, Personal Letter Vs Business Letter, Style of writing Business Letter, Principles of writing Business Letter, Layout of Business Letter, Types of Letter – Inquiry, order, quotation, claim & adjustment, sales, credits & Circular

Unit 4

Verbal Communications

Reading Skills: Purpose of reading, Understanding and Interpreting Ideas, Reading Rates, Reading & Interpretation, Interpreting Technical graphics in reading, Techniques of Reading, Reading Comprehensive Skills, Reasons for Poor the Reading Comprehensive Skills, **Conversation Practice:** Dialogue Practice, Telephonic Conversation, Speaking for Various Purposes, **Grammar & Vocabulary:** Parts of Speech, Tenses, Active Voice & Passive Voice, Confusable words

Unit 5

Language through Literature

Selected Stories from “Wise and Otherwise” by Sudha Murthy 1) A Lesson in Life from a Beggar 2) Death without Grief 3) Idealists at Twenty Realists at Forty 4) Think Positive, Be Happy 5) Crisis of Confidence 6) Sorry, the line is Busy 7) Oh Teacher, I Salute Thee 8) Life is an Examination

References Books

1. Green Andy, Effective Personal Communication Skills for Public Relations, Kogan Page, Limited, 2006.
2. John M. Penrose, Jr., Robert W. Rasberry, Robert J. Myers, Advanced Business Communication, Thomson/South-Western, 2004
3. Technical Communication, D.K.Chakradev, Tech-max publication.
4. Basic Business Communication, Flatly and Lesicar
5. Basic Communication Skills for Technology, Andrea J. Rutherford, Pearson Education
6. From sentence to paragraph, William J. Kelly and Deborah L. Lawton, Longman
7. Technical Communication: Principles and Practice, Meenaxi Raman and Sangeeta Sharma, Oxford Press
8. Wise and Otherwise, SudhaMurty, Penguin Books India Pvt. Ltd. Delhi
9. An Intermediate English Grammar, Raymond Murphy, Cambridge University Press
10. A High School English Grammar, Wren & Martin, S. Chand Publication

CTBTCSE SI L1: Engineering Physics Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|-----|-------|-----|------------------|-----|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 0 | 0 | 1 | 1 | 2 | - | - | - | - | - | - | 100 | 03:00 | 100 |

Experiments to support the associated theory course.

CTBTCSE SI L2: Fundamentals in Computer Programming with C **Laboratory**

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|-----|-------|-----|------------------|-----|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 0 | 0 | 1 | 1 | 2 | - | - | - | - | - | - | 100 | 03:00 | 100 |

Experiments to support the associated theory course.

CTBTCSE SI L3: Engineering Graphics Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|-----|-------|-----|------------------|-----|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 0 | 0 | 1 | 1 | 2 | - | - | - | - | - | - | 100 | 03:00 | 100 |

Experiments to support the associated theory course.

Semester II

CTMTCSE SII P1: Engineering Chemistry

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 00 | 02 | 02 | 02 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

* Note: TA-2 will be in form of assignments or workshops.

Objectives:

1. To understand the basic principles of chemistry.
2. To understand the importance of chemistry in engineering overall.
3. To understand the mole concept, wave nature of electrons, electronic configuration, different shapes of orbitals.

UNIT – I

Basic Chemistry

Properties of matter, Laws of chemical combination, **Dalton's atomic theory:** concept of elements, atoms and molecules, Isotopic (atomic) and molecular masses, mole concept and molar mass, percentage composition, empirical and molecular formula. Stoichiometry and calculations based on chemical reactions, pH, acids, bases pK, buffer solution.

UNIT – II

Atomic and Molecular Structure

Wave mechanics: de Broglie equation, Heisenberg's Uncertainty Principle and its significance, Quantum numbers and their significance, Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations, Variation of orbital energy with atomic number, Molecular orbital theory and shapes of s, p, d and f Orbitals.

UNIT – III

Basics of Organic Chemistry

Organic Compounds: Classification, and Nomenclature, Hybridization, Shapes of molecules, Influence of hybridization on bond properties. **Optical Isomerism:** Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Racemic mixture and resolution. Chemistry of aliphatic, aromatic hydrocarbons and Cycloalkanes.

Reference Books

1. Atkins, P.W. & Paula, J. Physical Chemistry, Oxford Press, 2006.
2. Vogel, A.I. A Textbook of Quantitative Inorganic Analysis, ELBS.
3. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications 1962.

4. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
5. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt.Ltd.(Pearson Education).

CTBTCSE SII P2: Engineering Mathematics -2

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 3 | 1 | 0 | 4 | 4 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To learn basic concepts of integral calculus, Cartesian and polar curves.
2. To study the applications of Integration to find length, area and volume.
3. To solve ordinary Differential Equations of first order and first degree.
4. To understand the behaviour (Convergence & Divergence) of infinite Series.

Unit 1

Reduction Formula

Reduction Formulae for $\int \sin^n x \, dx$, $\int \cos^n x \, dx$, $\int \sin^m x \cos^n x \, dx$, $\int \tan^n x \, dx$, $\int \cot^n x \, dx$ where m and n are positive integers with $m \geq 2$ and $n \geq 2$.

Unit 2

Functions, Elliptic integrals and Error functions

Gamma and Beta functions: Gamma function and its properties, Beta function and its properties, Relation between Beta and Gamma functions. **Elliptic integrals and Error functions:** Definitions and evaluation of the complete Elliptic integrals, Definitions and properties of Error functions, Cartesian and Polar curves, Length of plane curves, Area under a curve, Volume of a solid of revolution.

Unit 3

Multiple Integration

Double integrals and its evaluation, change of order of integration, Change of variables from Cartesian to polar coordinates, Triple integrals and its evaluation, Area by double integration, Volume of solids.

Unit 4

Differential Equations & their applications

ODE of first order & first degree, formation of differential equation, types of equation & methods for solving the differential equation-variable separable method, exact differential equation, integrating factors, linear equation and equation reducible to the linear form (Bernoulli equation). Applications: Electric circuits, orthogonal trajectories.

Unit 5

Infinite Series

Convergence of infinite Series by definition, Zero Test, Comparison Test, Ratio Test, Root Test, Alternating Series, Leibnitz's test, Power Series and radius of convergence.

References Books

1. E. Kreyszig, Advanced Engineering Mathematics, Wiley-India
2. Higher Engineering Mathematics – Vol. 1, Dr.K.R.Kachot, Mahajan Publ. house
3. Higher Engineering Mathematics, Thirty-fifth edition. B. S. Grewal, Khanna Publication.
4. Thomas' Calculus, Maurice D. Weir, Joel Hass, Frank R. Giordano, Person Education
5. Hughes – Hallett et al., Calculus – Single and Multivariable, JohnWiley and Sons

CTBTCSE SII P3: Object Oriented Programming with C++

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 3 | 0 | 0 | 3 | 3 | 25 | 00:30 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To learn basic concepts of object-oriented programming.
2. To learn the fundamentals in programming like classes, objects, tokens which can be used to solve real world problems.
3. To learn concepts of inheritance, polymorphism, operators.
4. To learn and understand programming practices for file management and exception handling.

Unit 1

Introduction to C++

Overview of POP, Basic Introduction to OOP, Basic Concepts of OOP, Benefits of OOP, Application of OOP, Structure of C++ program, simple C++ program, tokens - keywords, identifiers, constants, data types-fundamental, derived and user-defined, #define keyword, variables, basic operators, Operators in C++, conditional statements, Control structure.

Unit 2

Functions in C++

Introduction, User-defined function, function prototyping, call by value, Call by reference, inline function, default arguments, function overloading.

Unit 3

Classes and Objects

Introduction, structure Vs Class, defining class, inline function, access specifiers, nesting of member function, arrays within a class, static data members and member function, array of object, Object as function argument and returning objects, friend function, manipulating string: creating string objects, relational operations, characteristics and accessing, constructor with its different types with example - Copy Constructor, parameterized Constructor, destructor.

Unit 4

Operator overloading, Type conversion and Inheritance

Introduction, defining operator overloading, rules of operator overloading, overloading unary operator: prefix and postfix, Overloading Binary operator with and without friend function, Manipulation of string using operators, type conversion-Basic to class, class to basic and from one type to another. **Inheritance:** Introduction, defining a derived class, types of inheritance: single, multilevel, multiple, hierarchical, hybrid, Virtual base class, Abstract classes, Introduction to containership

Unit 5

Pointers, File Management & Exception Handling

Pointers, Virtual functions and polymorphism: Introduction, Polymorphism with its types, Pointers to objects, this pointer, Virtual function and pure virtual functions, **File Management:** Introduction, classes for file stream, file operations, file modes, file pointers and manipulators, updating a file, error handling and command line arguments. **Exception Handling:** Introduction of Exception Handling, Template, Standard Template Library (STL)

References Books

1. Object Oriented Programming with C++, E. Balagurusamy, PHI
2. Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia,
3. C++: The Complete Reference, Herbert Schildt, McGrawHill
4. C++ Programming, Black Book, Steven Holzner, DreamTech
5. Let us C++, Yaswant Kantikar, BPB

CTBTCSE SII P4: Digital Logic Design

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|---------|-------|-----|------------------|-----|------------------------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 2 | 0 | 0 | 2 | 2 | 25 | 45 Mins | 50 | 1.5 | 100 | 3 | - | - | 200 |

Objectives

1. To learn and understand various number systems and codes.
2. To understand digital circuits such as combinational and sequential logic circuits.
3. To understand different logic families such as TTL, DTL, ECL, etc.
4. To understand different types of memories.

Unit 1

Introduction to Digital Systems Design

Digital Systems, Binary Numbers, Number-Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary, Binary codes, Binary Storage & Registers, Binary Logic, Standard Graphic Symbols

Unit 2

Boolean Algebra & Logic Gates

Boolean Algebra: Introduction, Axiomatic Definition of Boolean Algebra, Basic Theorems, Properties of Boolean Algebra, Boolean Functions, Canonical & Standard forms, Logic Operations. **Logic Gates:** Introduction to Logic Gates & Integrated Circuits. **Gate Level Minimization:** Karnaugh Map (2-Variable, 3-Variable & 4-Variable K-Map), POS & SOP Forms, Don't Care Condition, NAND & NOR Implementation, Other Two-Level Implementations, Exclusive OR Function, Parity Generation

Unit 3

Logic Circuits

Logic Circuits: Introduction to Logic Circuits. **Combinational Logic Circuits:** Analysis of CLC, Design Procedure, Adders and Subtractors (Half & Full), Comparators, Multiplexers, Encoders, Decoders. **Sequential Logic Circuits:** Synchronous Sequential Logic Circuits, Latches, Flip-Flops, Asynchronous Sequential Logic Circuits, Circuits with Latches, Design Procedure, Analysis Procedure

Unit 4

Digital Circuits

Digital Circuits: Registers, Counters, Memory & Programmable Logic, RAM, ROM, Programmable Logic Array, Programmable Array Logic, Memory Decoding, Error Detection and Correction, Transistors, MOS, CMOS, Special Characteristics, Bipolar Transistor Characteristics.

Unit 5

Hardware Description Languages (HDLs)

Introduction to HDL: Verilog, VHDL & **System Verilog:** Introduction, Data Types, Naming Convention, Operators Explicit Behavioural Intent, Bottom-Testing Loop, **working with HDL:** Truth tables in HDL, HDL Models of Combinational Circuits, VHDL (Process Statements, Variables), Writing Simple Testbench, Logic Simulation, HDL Models of Registers & Counters, RTL Notations & Descriptions, ASMs, HDL description of Binary Multiplier, Design with Multiplexers, Switch Level Modelling with HDL

References Books

1. Digital Design with an Introduction to the Verilog HDL, VHDL, and SystemVerilog by M. Morris Mano & Michael D. Ciletti, Pearson Education Inc.
2. Digital logic and computer Design”, M. Morris Mano, PHI Publication
3. “Fundamentals of Digital Circuits”, A. Anandkumar, PHI Publication
4. “Digital Electronics”, R. P. Jain, TMH Publication
5. “Digital Electronics and Logic Design”, B. Somanathan Nair, PHI publication

CTBTCSE SII P5: Professional Ethics

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|---------|-------|-----|------------------|-----|------------------------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 2 | 1 | 0 | 3 | 3 | 25 | 45 Mins | 50 | 1.5 | 100 | 3 | - | - | 200 |

Objectives

1. To understand the basics of human values.
2. To understand the importance of values and ethics in personal lives and professional careers.
3. To learn the rights and responsibilities as an employee, team member and a global citizen.
4. To maintain ethical conduct and discharge their professional duties.

Unit 1

Human Values

Morals, values and Ethics, Integrity, Work ethic, Service learning, Civil virtue, Respects for others, living peacefully, Caring, Sharing, Honesty, Courage, Valuing time, Cooperation, Commitment, Empathy, Self-confidence, Character, Spirituality, Social expectations.

Unit 2

Engineering Ethics

Senses of Engineering Ethics, Evolution of ethics over the years, Distinction between values and Ethics, Variety of moral issues, Types of inquiry, Moral dilemmas, Moral Autonomy, Kohlberg 's theory, Gilligan 's theory, Consensus and Controversy, Models of professional roles, Theories about right action, Self-interest, Customs and Religion, Uses of Ethical Theories, Indian Ethical Traditions.

Unit 3

Professional Practices in Engineering

Codes of Ethics, plagiarism, piracy, A Balanced Outlook on Law, Professions and norms of professional conduct, norms of Professional Conduct vs Profession; Responsibilities, Obligations and moral values in professional ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. **Central responsibilities of engineers:** Lessons from Bhopal Gas tragedy, Lessons from SLV-3, Lessons from Indian Space Shuttle (Wings of Fire),

Lessons from International Incidents (Titanic Tragedy /Chernobyl Nuclear Tragedy / American Airline DC-10 Crash / Kansas City Hyatt Regency Walk Away Collapse).

Unit 4

Responsibilities and Rights of Engineer

Responsibilities and accountability while dealing with public issues (safety, hazards, risk), Collegiality towards other engineers (working in the same organization or outside) and loyalty (towards employer), obligation of loyalty and misguided loyalty, respect for authority and its limitations, Bootlegging, Collective bargaining, Commitments and convictions, Confidentiality, Occupational crime and industrial espionage, Whistle blowing and moral guidelines, conflicts of interests, bribes, gifts, kickbacks, Discrimination, preferential treatment and harassment rights of engineers, engineers as managers and leaders promoting ethical climate.

Unit 5

Global Issues

Global issues in Professional Ethics: Introduction, Current Scenario, Multinational Corporations, Environmental Ethics, Computer Ethics, Weapon Development, Engineers as managers, Consulting engineers, Engineers as expert witnesses and advisors, moral leaderships, code of conducts, corporate social responsibility, International Trades, World Summits, Human Values for Indian Managers, Lessons from Ancient Indian Education system, The law of Karma, Quality of Working life, Ethics of Vivekananda, Gandhiji, Aurobindo and Tagore.

References Books

1. Engineering Ethics, M. Govindrajan, S Natarajan and V S Senthil Kumar, PHI Learning Pvt. Ltd., New Delhi, 2012.
2. A textbook on Professional Ethics and Human Values, R S Nagarajan, New Age International Private Limited; First edition (2020); New Age International Pvt Ltd.
3. Ethics in Engineering, Mike W. Martin and Roland Schinzinger, Tata McGraw Hill, New Delhi, 2003.
4. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
5. Indian Culture, Values and Professional Ethics, P S R Murthy, B S Publications, Hyderabad, 2013.
6. Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press, 2015.
7. Lt Gen Dr. M. L. Chibber : “Leadership-Education in Human Values”, Sri Sathya Sai Books and Publications Trust, Prasanthinilayam, 1st Edition, 2009.

8. Wings of Fire, APJ Abdul Kalam, University Press Publications, 2013
9. Ethics in Management and Indian Ethos by Biswanath Gosh
10. Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

CTBTCSE SII P6: Fundamentals of Forensic Science and Cyber Law

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 2 | 1 | 0 | 3 | 3 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To learn about the significance of forensic science to human society and criminal investigation.
2. To understand the fundamental principles of forensic science.
3. To understand the working of the forensic establishments in India and abroad
4. To learn the legal aspects of forensic investigations

Unit 1

Introduction to Forensic Science

History of Development of Forensic Science in India. Functions of forensic science. Historical aspects of forensic science. Definitions and concepts in forensic sciences. Scope of forensic science. Various contemporary disciplines of forensic sciences and their applications in different approaches with theoretical concepts Need of forensic science. Basic principles of forensic science.

Unit 2

Forensics Science requirements

Contemporary development in the academic and practices in forensic sciences- advantage of scientific investigations- Tools and Techniques in Forensic Science- Branches of forensic science. Forensic science in international perspectives, including set up of INTERPOL, and FBI. Duties of forensic scientists. Code of conduct for forensic scientists. Qualifications of forensic scientists. Data depiction. Report writing.

Unit 3

Forensic Sciences and Government

Academic institutions involvement -Organizational set up of Forensic Science Laboratories in India Hierarchical set up of Central Forensic Science Laboratories, State Forensic Science Laboratories, Government Examiners of Questioned Documents, Fingerprint Bureaus, National Crime Records Bureau, Police & Detective Training Schools, NIA, CCNTS, Bureau of Police Research & Development, Directorate of Forensic Science and Mobile Crime Laboratories. Police Academies.

National investigation agency and other agencies involved in the criminal investigations- agencies referred for the additional information and requisite examinations

Unit 4

Forensics Sciences and Laws

Definition of Law, Court, Judge, Basic Terminology in Law, Introduction to Criminal Procedure Code, FIR, Difference between civil and Criminal Justice, Object of Punishment, Kinds of Punishment, Primary and Sanctioning Rights Primary and Secondary functions of Court of Law. Law to Combat Crime-Classification – civil, criminal cases. Essential elements of criminal law. Constitution and hierarchy of criminal courts. **Criminal Procedure Code:** Cognizable and non-cognizable offences. Bailable and nonbailable offences. Sentences which the court of Chief Judicial Magistrate may pass. **Laws specific to Forensic Science:** Indian Penal Code pertaining to offences against persons – Section 121A, 299, 300, 302, 304A, 304B, 307, 309, 319, 320, 324, 326, 351, 354, 359, 362. Sections 375 & 377 and their amendments. **Indian Evidence Act:** Evidence and rules of relevancy in brief. Expert witness. Cross examination and re-examination of witnesses. Sections 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 138, 141. CrPC – Sections 291, 291A, 292 & 293 in the code of criminal procedure.

Unit 5

Cyber Laws

Introduction to Computer and its components, different types of storage media, Category to Cyber-crime, Cyber Law, IT Act 2000 and its amendments, International Cyber Laws, Cyber Ethics, Child Sexual Abuse Material related to cyber domain, various acts related to social media, privacy and security on cyber domain, case studies.

References Books

1. B.B. Nanda and R.K. Tiwari, Forensic Science in India: A Vision for the Twenty First Century, Select Publishers, New Delhi (2001).
2. M.K. Bhasin and S. Nath, Role of Forensic Science in the New Millennium, University of Delhi, Delhi (2002).
3. S.H. James and J.J. Nord by, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005).
4. W.G. Eckert and R.K. Wright in Introduction to Forensic Sciences, 2nd Edition, W.G. Eckert (ED.), CRC Press, Boca Raton (1997).
5. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).

6. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013)
7. Tallinn Manual on The International Law Applicable To Cyber Warfare, International Group of Experts and NATO by Michael N. Schmitt
8. IT Act 2000 and 2008 bare acts documents
9. Cyber Law in India, Satish Chandra (2017)

CTBTCSE SII P7: Environmental Sciences

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|-----|-------|-----|------------------|-----|------------------------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 0 | 0 | 0 | 0 | 0 | - | - | - | - | - | - | - | - | - |

Objectives

1. To learn about environmental sciences.
2. To understand the fundamental of natural resources and ecological systems.
3. To understand the working biogeochemical cycle.
4. To understand biodiversity and study about environmental pollution & its factors.

Unit 1

The Multidisciplinary nature of environmental studies

The Multidisciplinary nature of environmental studies, Concept of biosphere – lithosphere, hydrosphere, atmosphere; Biogeochemical cycle.

Unit 2

Environment Concept

Principles and scope of Ecology; concepts of ecosystem, population, community, biotic interactions, biomes, ecological succession

Unit 3

Natural Resources

Renewable and non-renewable resources, Forest resources, Water resources, Mineral resources, Food resources, Energy resources, Land resources.

Unit 4

Environmental Pollution

Causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution & Nuclear hazards.

Unit 5

Biodiversity and It's Conservation

Introduction – Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity:

habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

References Books

1. Masters, G.M., "Introduction to Environmental Engineering and Science", Prentice –Hall of India Pvt. Ltd., (1991) M.K. Bhasin and S. Nath, Role of Forensic Science in the New Millennium, University of Delhi, Delhi (2002).
2. Masters, G.M., "Introduction to Environmental Engineering and Science", Prentice –Hall of India Pvt. Ltd., (1991)
3. Odum, E.P., "Ecology: The Link between the natural and social sciences", IBH Publishing Com., Delhi

CTBTCSE SII L1: Engineering Chemistry Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 0 | 0 | 1 | 1 | 2 | - | - | - | - | - | - | 100 | 03:00 | 100 |

Experiments to support the associated theory course.

CTBTCSE SII L2: Object Oriented Programming with C++ Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 0 | 0 | 1 | 1 | 2 | - | - | - | - | - | - | 100 | 03:00 | 100 |

Experiments to support the associated theory course.

CTBTCSE SII L3: Digital Logic Design Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|---|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 0 | 0 | 1 | 1 | 2 | - | - | - | - | - | - | 100 | 03:00 | 100 |

Experiments to support the associated theory course.

SEMESTER – III

CTMTCSE SIII P1: Engineering Mathematics - 3

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 03 | 01 | 00 | 04 | 04 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To represent periodic functions in terms of infinite trigonometric series
2. To solve higher order ordinary differential equations
3. To solve linear partial differential equations of first and second order
4. To learn Laplace transform technique
5. To study the numerical methods to solve transcendental equations

UNIT – I

Introduction to Fourier Series

Periodic functions, Dirichlet's conditions, Trigonometric series, Euler's formulae, Fourier expansion of periodic functions with period $2p$, Fourier series of even and odd functions, Fourier series of periodic functions with arbitrary periods, half range Fourier series, Harmonic analysis.

UNIT – II

Laplace Transforms and Applications

Definition of the Laplace transform, Inverse Laplace transform, Linearity property, First Shifting theorem, Laplace Transforms of derivatives and integrals, Differentiation and integration of Laplace transforms, Convolution theorem, Solution of Differential equations using Laplace Transform, Unit step function, Second shifting theorem, Dirac's delta function.

UNIT – III

Ordinary Differential Equations and Applications

Linear differential equations of second and higher order: Higher order linear differential equations with constant coefficients, Complementary Function (C.F.), Short cut methods for finding Particular Integrals (P.I.), General method: $[1/f(D)] r(x)$ method for finding particular integral, Wronskian, Solution by method of variation of parameters, Cauchy's Homogeneous linear differential equation, Legendre's Homogeneous linear differential equation.

UNIT – IV

Partial Differential Equations and Applications

Formation of PDEs, Solution of Partial Differential equations $f(x,y,z,p,q) = 0$, Solution

of PDE by direct integration, Linear PDEs with constant coefficients, Classification of second order linear PDEs, Applications of PDE: Separation of variables, Solution of Wave equation, Heat equation and Laplace equation.

UNIT – V

Numerical Solution of Algebraic & Transcendental Equation

Solution of algebraic and transcendental equations: Bisection method, Regula falsi method, Secant method, Newton-Raphson method, rate of convergence.

Reference Books

1. Higher Engineering Mathematics – Vol. 2, Dr. K. R. Kachot, Mahajan Publ. house.
2. Advanced Engineering Mathematics (8th Edition), E. Kreyszig, Wiley-India (2007).
3. Engineering Mathematics -Vol 2, by Baburam, Pearson
4. Higher Engineering Mathematics, Thirty-fifth edition. B. S. Grewal, Khanna Publication.
5. Elementary Differential Equations (8th Edition), W. E. Boyce and R. DiPrima, John Wiley (2005).
6. Fourier series and boundary value problems, R. V. Churchill and J. W. Brown, McGraw-Hill (7th Edition -2006).

CTMTCSE SIII P2: Data Structures

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 03 | 00 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives:

1. To develop proficiency in the specification, representation, and implementation of Data Types and Data Structures.
2. To be able to carry out the Analysis of various Algorithms for mainly Time and Space Complexity.
3. To get a good understanding of applications of Data Structures.
4. To develop a base for advanced computer science study.

UNIT – I

Introduction to Data Structures

Data Structures concepts, Data types – primitive and non-primitive, Big O, Omega, Theta and Little Notation with examples (Time & Space Analysis of Algorithms), Concept of iteration and recursion (Types of iteration and recursion), Introduction to types of Data Structures- Linear & Non-Linear Data Structures.

UNIT – II

Sorting and Searching

Sorting: Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Quick Sort, Shell Sort,
Searching: Sequential Search, Binary Search.

UNIT – III

Linear Data Structure

Array: Representation of arrays, Types of array, Dynamic array creation, Applications of arrays, **Stack:** Definitions & Concepts, Operations on Stacks, Applications of Stack, Polish Expression, Reverse Polish Expression and their compilation, Evaluation of Expression, **Queue:** Definitions & Concepts, Operations on Queue, Types, and Applications of Queue, **Linked List:** Definitions & Concepts, Types of linked list, and Applications of each linked list type, Linked implementation of Stack, and Queue.

UNIT – IV

Non-Linear Data Structure

Tree: Definitions and Concepts, Representation of binary tree, Binary tree traversal (In-order, Post-order, Pre-order), Threaded binary tree, Binary search Trees, Conversion of General Trees to Binary Trees, Applications of Trees, **Types of Tree:** Binary Search Tree (BST), AVL Tree, B Tree, B+ Tree: Insert, Delete and traversal operation of each tree.

UNIT – V

Non-Linear Data Structure and Hashing

Graph: Definition and concept of graph, Different types of graph, Representation of graph in computer memory, BFS and DFS strategy, minimum spanning tree (Prim's and Kruskal's algorithm), concept of Shortest path. **Hashing:** The symbol table, Hashing Functions, Collision – Resolution Techniques, File Structure: Concepts of fields, records and files, Sequential, Indexed and Relative/Random File Organization, Indexing structure for index files.

Reference Books

1. An Introduction to Data Structures with Applications, by Jean-Paul Tremblay & Paul G. Sorenson, Tata McGraw Hill, 2nd Edition.
2. Data Structures and Algorithms, Shi-Kuo Chang, World Scientific Publications.
3. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, Prentice-Hall Prof, 2nd Edition.
4. Data Structures using C & C++, By Yedidyah Langsam, Augenstein and Tenenbaum, Pearson Education India
5. Design and Analysis of Algorithms, S. Sridhar, Oxford University Press

CTMTCSE SIII P3: Database Management System

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 00 | 00 | 02 | 02 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To Understand basic concepts of database systems and its architecture.
2. To Extrapolate types of data models and database systems.
3. To Draw an Entity-Relationship diagram and extrapolate the concept of Normalization.
4. To Distinguish between the DDL, DCL, TCL, DML, DQL. Extrapolate the restricting and sorting the data.
5. To understand the concepts of joining, grouping and subquery.

UNIT – I

Basic Concepts & Database System Architecture

Basic Concepts: Introduction to Data, Information, Data Item or Field, Database and Database Systems, Records, Files, Metadata System Catalogue, Data Warehouse, Data dictionary, DBA and File oriented System versus database system. Database System Architecture, Schemas, Sub-Schemas, Instances, Three-Level ANSI SPARC Database Architecture (Internal Level, Conceptual Level, External Level), Advantages of three-tier Architecture, Functions of DBMS.

UNIT – II

Basic Concepts & Database System Architecture

Types of Data Models: Physical Data Models, Hierarchical Data Model, Network Data Model, Relation Data Model, Entity – Relationship (E-R) Data Model, Object – oriented Data Model, **Types of Database Systems:** Centralized Database System, Parallel Database System, Parallel Database System, Client / Server Database System, Distributed Database System.

UNIT – III

Entity-Relationship (ER) Model & Normalization

Basic Entity-Relationship Concepts, Entities, Relationship, Attributes, E-R Diagram symbols, Examples of E-R Diagram, Specialization and Generalization, Introduction to Normalization and Normal Forms (1 NF, 2 NF, 3 NF, BCNF).

UNIT – IV

SQL Statements

Use of DDL Statements to Create and Manage Tables - Categorize the main database objects, Review the table structure, List the data types available for columns, Create a simple table, Decipher how constraints can be created at table creation, Describe how schema objects work. Data Manipulation Statements - Describe each DML statement, Insert rows into a table, Change rows in a table by the UPDATE statement, Save and discard changes with the COMMIT and ROLLBACK statements. Retrieve Data using the SQL SELECT Statement - List the capabilities of SQL SELECT statements, Generate a report of data from the output of a basic SELECT statement, Select All Columns, Select Specific Columns, Use Column Heading Defaults, Use Arithmetic Operators, Understand Operator Precedence, Learn the DESCRIBE command to display the table structure. Restricting and Sorting Data - Write queries that contain a WHERE clause to limit the output retrieved, List the comparison operators and logical operators that are used in a WHERE clause, Describe the rules of precedence for comparison and logical operators, Use character string literals in the WHERE clause, Write queries that contain an ORDER BY clause to sort the output of a SELECT statement, Sort output in descending and ascending order. Single Row Functions – Character Functions (Lower, upper, initcap, concat, substr, length, instr, lpad, rpad, trim, replace), Date Functions (Round, trunc, mod), Date Functions (Months_between, add_months, next_day, last_day, round, trunc), Conversion Functions (to_char, to_number, to_data), General Functions (NVL, NVL2, COALESCE, CASE...WHEN)

UNIT – V

Joining, Grouping and Subqueries

Aggregate Data Using the Group Functions: Use the aggregation functions to produce meaningful reports, Divide the retrieved data in groups by using the GROUP BY clause, Exclude groups of data by using the HAVING clause. Display Data from Multiple Tables Using Joins: Write SELECT statements to access data from more than one table, View data that generally does not meet a join condition by using outer joins, Join a table to itself by using a self-join. Use Sub-queries to Solve Queries: Describe the types of problem that sub-queries can solve, Define sub-queries, List the types of sub-queries, Write single-row and multiple-row sub-queries, Multiple-Column Subqueries, Pairwise and Non-pairwise Comparison, Scalar Subquery Expressions, Solve problems with Correlated Subqueries, Update and Delete Rows Using Correlated Subqueries, The EXISTS and NOT EXISTS operators, Invoke the WITH clause.

Reference Books

1. Database Systems Concepts, design and Applications 2/e Singh, S. K., Pearson Education, New Delhi, 2011
2. An introduction to Database Systems, C J Date, Addition-Wesley.
3. Silberschatz, Korth, "Data base System Concepts"., McGraw hill, 2008.
4. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems (3/e), McGraw Hill, 2003
5. Sommerville, "Software Engineering", 8th Edition, Pearson Education
6. Peter Rob and Carlos Coronel, Database System- Design, Implementation and Management (7/e), Cengage Learning, 2007.
7. Json Price, Oracle Database 12c SQL, Master SQL, Oracle Press
8. "Oracle Database SQL Language Reference 12c" Release 1

CTMTCSE SIII P4: Java Programming

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 03 | 00 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To understand concepts of object-oriented programming language and implementation of the same with real time applications.
2. To develop proficiency in creating robust applications using the Java Programming Language.
3. To understand concepts of abstract, Interface, Nested Class, Regular Expression and Collection Framework.
4. To understand development of Application using File and Multi-threading.
5. To understand database connectivity and work with the JDBC applications.

UNIT – I

Introduction to OOP's

What is OOP, Difference between Procedural and Object-oriented programming, Basic OOP concept - Object, classes, abstraction, encapsulation, inheritance, polymorphism, History of Java, Features of Java, JDK Environment, Java Virtual Machine. Define class with instance variable and methods, Object creation of class, accessing member of class, Argument passing, Constructors, Method overloading, static data, static methods, static blocks, this keyword

UNIT – II

Inheritance, Packages & Access Specifier

Super class & subclass, Abstract method and classes, Method overriding, final keyword, super keyword, implementing interfaces, User defined interfaces. Importing classes, User defined packages, Modifiers & Access control (Default, public, private, protected). Object class & String class, Wrapper classes, understanding pass by value and pass of reference, Comparable and Comparator interface

UNIT – III

Exception Handling, Nested Classes & Regex

Discuss the purpose of Exception Handling in Java, Explain the types of exception in Java, Describe the use of try and catch, Explain the use of throws and throw, Describe

the finally keyword. Member Inner class, Local Inner class, Nested Interface, Nested Class: What and Why? Anonymous Inner class, static nested class, enum. Collection, Set & List Interface with sub classes and interfaces, Map interface, Generic Collection framework, Pattern and Matcher, Varargs

UNIT – IV

File Handling and Multithreading

Read and Write data into file with OutputStream, InputStream, Reader and Writer classes and its sub classes, Bridge classes. Describe Multithreading, Creating and Managing Threads, Discuss the life cycle of threads, Understand the concept of synchronization, explain how to set the priorities of thread, understand what a daemon thread does

UNIT – V

GUI Programming, Building Applets, Comparing AWT and Swing Features

AWT Components, Overview of the AWT components, Component properties, Graphics context, Containers, Container class, Layout Managers, Top-level containers, Window class, Decorated windows Frame and Dialog, Panel class, Events, Event Delegation Model, AWTEvents, Adapter classes, Swing and MVC, JComponent, JOptionPane, Showing Message, Confirm and Input Dialogs, Browser as a container for Applets, Life-cycle of an Applet

Reference Books

1. Java Complete Reference – 11th Edition Herbert Schildt – 2019
2. Oracle Certified Java Programmer – 1Z0-815 – Hanumant Deshmukh
3. Thinking in Java, Bruce Eckel – Publisher Prentice Hall
4. Cay S. Horstmann “Core Java , Volume I – Fundamentals”, 10th Edition, Pearson Education, 2017
5. Cay S. Horstmann “Core Java , Volume II – Advanced Features”, 10th Edition, Pearson Education , 2017
6. Ken Arnold, James Gosling, David Holmes, “The Java Programming Language”, Addison-Wesley Pearson Education (4th Edition – 2005).
7. Raj Kumar Buyya, S. Thamarai Selvi, & Xing Chen Chu, “Object-Oriented Programming with Java: Essentials & Applications”, Tata McGraw Hill

CTMTCSE SIII P5: Computer Organization & Architecture

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 01 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To understand the structure, function and characteristics of computer systems.
2. To understand the design of the various functional units and components of computers.
3. To explain the function of each element of a memory hierarchy.
4. To understand the basic of CPU Organization.
5. To learn assembly language programming concepts.

UNIT – I

Introduction to Computer Organization

Complete computer description, Central Processing Unit Introduction, memory, input-output subsystems, control unit. Instruction set architecture of a CPU - registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study - instruction sets of some common CPUs, Basic Computer Organization and Design Instruction codes, Computer registers, computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input-output and interrupt.

UNIT – II

Data Representation

Signed number representation, fixed and floating-point representations, character representation. Computer Arithmetic: Introduction, Addition and subtraction, Floating Point Arithmetic operations, Decimal Arithmetic Unit ripple carry adder, carry look-ahead adder, etc. Multiplication Algorithms: shift-and-add, Booth multiplier, carry save multiplier, etc. Division Algorithms: non-restoring and restoring techniques. Input-Output Organization: Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, Input-Output Processor (IOP), CPU IOP Communication, Serial communication.

UNIT – III

Assembly Language Programming

Introduction to Assembly, Machine Language, Assembly Language Programming:

Arithmetic and logic operations, looping constructs, Subroutines, I-O Programming. Micro programmed Control Organization: Control Memory, Address sequencing, Micro program example, Design of Control Unit, Design of Basic computer, Design of Accumulator Unit, General Register Organization, Stack Organization, Instruction format, Addressing Modes, Data transfer and manipulation, Program control, Reduced Instruction Set Computer (RISC) & Complex Instruction Set Computer (CISC).

UNIT – IV

Pipeline & Vector Processing

Pipeline And Vector Processing Flynn's taxonomy, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction, Pipeline, RISC Pipeline, Vector Processing, Array Processors.

UNIT – V

Memory Organization

Memory Organization, Memory Hierarchy Types of Memory: Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, cache size vs block size, mapping functions, replacement algorithms, write policy.

Reference Books

1. Computer Architecture, Fourth Edition: A Quantitative Approach by John L. Hennessey, David A. Patterson, Morgan Koffman. 2006
2. Computer Organization and Architecture, William Stallings, Prentice Hall, 7th edition 2006.
3. Computer Architecture and Organization by John P. Hayes, McGraw-Hill 3rd edition, 2002.
4. Computer Organization and Design, 4th Ed, D. A. Patterson and J. L. Hennessy
5. Computer Architecture, Berhooz Parhami

CTMTCSE SIII P6: System Analysis Design and Unified Modelling Language

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 00 | 00 | 02 | 02 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To study the underlying concepts of Object-Oriented Modelling.
2. To understand the concepts of various types of modelling approaches.
3. To study notations of Unified Modelling Language.
4. To understand the system development life cycle.
5. To analyze and design solutions to problems using object-oriented approach.

UNIT – I

Object Oriented and Modelling Concepts

Introduction to Object Orientation, Object Oriented Development and Themes (Abstraction, Encapsulation, Combining Data & Behaviour, Sharing), History and Need of Object Orientated Modelling, Introduction to Modelling and its need, The **Three Models**: Class, State and Interaction Model, The Three Models Relationship. **System Development Life Cycle**: Phases, System Definition and Concepts, System Analyst and roles.

UNIT – II

Class Modelling

Class Modelling: Introduction to Objects and Classes, Values and Attributes, Operations and Methods, Link and Association Concepts, Generalization and inheritance, Class Model, Navigation of Class model. **Advanced class Modelling**: Advance concepts, Association Ends, N-array Associations, Aggregation, Abstract classes, Multiple inheritance, Metadata, Reification, Constraints, Derived Data and Packages.

UNIT – III

State Modelling

State Modelling: Introduction to Events, States, Transitions and Conditions, State Diagrams, State Diagram behaviour. **Advance State Modelling**: Nested State Diagram, Nested States, Signal Generalization, Concurrency, State Model, Relation of

class and State Models.

UNIT – IV

Interaction Modelling

Interaction Modelling: Use Case model, Sequence Models, Activity Models.

Advanced Interaction Modelling: Use case relations, Procedural sequence Models, Special constructs of activity Models

UNIT – V

System & Class Design

System Design: Overview, Estimating performance, Making a reuse plan, system breakup into subsystems, Identifying concurrency, subsystems allocation, Data Storage Management, Handling global resources, Choosing a software control strategy, Handling boundary conditions, Setting trade off priorities, common architectural styles, Architecture of the ATM system, **Class Design:** Overview, gap, realizing use cases, Designing algorithms, Recursing downward, refactoring, Design optimization, Reification of behaviour, Adjustment of inheritance, Organizing a class design, ATM Example.

Reference Books

1. Object Oriented Modeling and design with UML, By Michael Blaha, James Rumbaugh, Pearson
2. Object Oriented Analysis, Design and Implementation By Brahma Dathan, Sarnath Ramnath, University Press
3. Object Oriented Systems and Development By Ali Bahrami Tata McGrawHill Edition.
4. Modern System Analysis and Design, Jeffrey A. Hofer Joey F. George Joseph S. Valacich Addison Weseley

CTBTCSE SIII L1: Data Structures Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 |

Experiments / Practical's to support the associated theory course.

CTBTCSE SIII L2: Database Management System

Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|-----------|------------------------|-------|-----|-------|--|
| Th | Tu | Pr | C | TCH | Theory | | | | | Practical | | | | Total | |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | | | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 | | |

Experiments / Practical's to support the associated theory course.

CTBTCSE SIII L3: Java Programming Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 |

Experiments / Practical's to support the associated theory course.

SEMESTER – IV

CTMTCSE SIV P1: Engineering Mathematics - 4

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 03 | 00 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To analyze Predicate Calculus and Fuzzy set theory
2. To solve Graph Theory
3. To solve Lattices Problem
4. To create a modelling of engineering problems.
5. To understand the approach to statistical concepts.

UNIT – I

Introduction to Propositional and Predicate Logic & Fuzzy Sets

Propositional Logic: Definition, Statements & Notation, Truth Values, Connectives, Statement Formulas & Truth Tables, Well-formed Formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Examples. Predicate Logic: Definition of Predicates; Statement functions, Variables, Quantifiers, Predicate Formulas, Free & Bound Variables; The Universe of Discourse, Examples, Valid Formulas & Equivalences, Examples, Fuzzy Sets: Introduction to Fuzzy Sets, Basic operations on fuzzy sets, Image and inverse images, I-V fuzzy sets, fuzzy relations.

UNIT – II

Basics Statistics

Measure of central tendency: Moments, Expectation, dispersion, skewness, kurtosis, expected value of two-dimensional random variables, Linear Correlation, correlation coefficient, rank correlation coefficient, Regression.

UNIT – III

Lattices

Poset, Lattice as a Poset, properties of lattices as an algebraic system, sub lattices, Direct product, Complete Lattice, Bounded Lattice, Distributive Lattice, Complemented Lattice, Homomorphism and Isomorphism of lattices

UNIT – IV

Curve Fitting

Curve fitting by of method of least squares, fitting of straight lines, second degree

parabola and more general curves.

UNIT – V

Graph Theory & Combinatory

Basic concept of graph theory, basic definitions, Path Reachability and connectedness, Matrix representation of graphs, Trees, counting techniques – pigeon-hole principle, infinite sets, mathematical induction, Permutations. Generating functions, Recurrence relation.

Reference Books

1. Discrete Mathematics and Its Applications with Combinatorics and Graph Theory (SIE) by Kenneth H. Rosen, Tata McGraw Hill, 8th Edition.
2. Discrete Mathematical structures with application to computer science by Jean-Paul Tremblay, R. Manohar, McGraw-Hill.
3. Applied discrete structures for computer science by Alan Doerr, Kenneth Levasseur, Macmillan.
4. D. C. Montgomery and G. C. Runger, Applied Statistics and Probability for Engineers, Wiley.
5. Elements of Discrete Mathematics by C. L. Liu, McGraw-Hill, 2nd Edition.
6. J. L. Devore, Probability and Statistics for Engineering and the Sciences, Cengage Learning.

CTMTCSE SIV P2: Computer Networks

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 03 | 00 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To learn about data communication
2. To learn about the network devices and its functionality.
3. To learn the services running on various network layers.
4. To learn the network topologies and their implementation.
5. To understand routing protocols.

UNIT – I

Data Communication

Data and Signals: Analog and Digital, Periodic Analog Signals, Digital Signals, performance, **Digital Transmission:** Digital to Digital and Analog to Digital Conversion, Transmission Modes, Analog Transmission. **Bandwidth Utilization:** Multiplexing, Spread Spectrum.

UNIT – II

History and Models

Introduction, history and development of computer networks and internet, various protocols and standards, network topologies, **Network Categories:** LAN, MAN, WAN, network reference model OSI and TCP/IP protocol suite.

UNIT – III

Physical and Link

Various transmission media (guided media and unguided media), wireless transmission media, errors in transmission: attenuation, noise. Repeaters. Data Link Layer: Error Detection & Correction Techniques, Elementary Data Link Layer **Protocols:** Simplex, Stop and Wait, Sliding Window Protocol.

UNIT – IV

Middle Layer

Medium Access Control sublayer: channel allocation problem, Multiple Access Protocols: ALOHA, CSMA, CSMA/CA, CSMA/CD, Ethernet, Data link layer switching, VLANs. Networking Devices (hub, switch, bridge, router, gateway, repeater), comparison of network devices, network core (packet switching, circuit switching).

UNIT – V

Network Layer

Types of Addressing, IPv4 and IPv6 Addressing scheme, Transition from IPv4 to IPv6, IP forwarding, classful and classless addressing (subnet, supernet), NAT, Basics of routing algorithms.

Reference Books

1. Computer Network by Andrew S. Tanenbaum and David J. Wetherall, 5th Edition
2. Computer Networking- A Top-Down approach (7th edition), Kurose and Ross, Pearson
3. Computer Networks- A Top-Down approach, Behrouz Forouzan, McGraw Hill
4. TCP/IP Protocol Suite (4th edition), Behrouz Forouzan, McGraw Hill
5. Data Communications and Networking By Behrouz A. Forouzan, 5th Edition

CTMTCSE SIV P3: Microprocessor & Microcontroller

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 00 | 00 | 02 | 02 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To develop an in-depth understanding of the operating of microprocessors.
2. To understand the concept of Interrupts and interfacing details in microprocessors.
3. To understand the instruction sets and programs.
4. To study about ARM based processors.
5. To create an exposure to basic peripherals, its programming and interfacing techniques.

UNIT – I

Introduction to Microcontrollers

Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051. **8051 Real Time Control:** Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters.

UNIT – II

Introduction to 8086

8086 Architecture: 8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086, interrupts of 8086. **Instruction Set and Assembly Language Programming of 8086:** Instruction formats, addressing modes, Instruction Set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

UNIT – III

Introduction x86 microprocessor

Brief history of the x86 family, Inside the 8088/86, Introduction to assembly programming, Introduction to Program Segments, The Stack, Flag register, x86 Addressing Modes. Assembly language programming: Directives & a Sample

Program, Assemble, Link & Run a program, More Sample programs, Control Transfer Instructions, Data Types and Data Definition, Full Segment Definition, Flowcharts and Pseudo code.

UNIT – IV

x86 microprocessor and Programming

Instructions sets description, Arithmetic and logic instructions and programs: Unsigned Addition and Subtraction, Unsigned Multiplication and Division, Logic Instructions, BCD and ASCII conversion, Rotate Instructions. INT 21H and INT 10H Programming: Bios INT 10H Programming, DOS Interrupt 21H. 8088/86 Interrupts, x86 PC and Interrupt Assignment.

UNIT – V

Overview of ARM & Advance ARM Processors

ARM Architecture: ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions. **Advanced ARM Processors:** Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture.

Reference Books

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Danny Causey, The x86 PC Assembly Language Design and Interfacing, 5th Edition, Pearson, 2013.
2. ARM system developers guide, Andrew N Sloss, Dominic Symes and Chris Wright, Elsevier, Morgan Kaufman publishers, 2008.
3. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, MHE, 2nd Edition 2006.
4. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed.
5. Douglas V. Hall: Microprocessors and Interfacing, Revised 2nd Edition, TMH, 2006.
6. The Definitive Guide to the ARM Cortex-M3, by Joseph Yiu, 2nd Edition , Newnes, 2009
7. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012

CTMTCSE SIV P4: Operating System

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 01 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives:

1. To learn and understand the concepts of operating system.
2. To learn and understand the underlying operating system services.
3. To study the concepts of memory management.
4. To study the concepts of storage management.
5. To study about various file structures and systems.

UNIT – I

Introduction to Operating Systems

History of Operating System, Introduction, Types of Operating Systems. **Operating System Concepts:** Process, Address Space, Input / Output, Files. **Computer System organization and architecture:** overview, Operations, Resource Management overview, Security & Protection, Services, User & OS Interface, System Calls, Services, Linkers & Loaders, OS Design & Implementation, OS Structure, Building and Booting of Operating System, OS Debugging.

UNIT – II

Introduction to Operating Systems

Process Management: Concept, Inter process Communication. Threads & Concurrency: Overview, Multicore Programming, Multithreading Models, Libraries, Issues in threading, Scheduling: CPU Scheduling Overview, Scheduling Algorithms, Thread Scheduling, Multi-Processor Scheduling, **Process Synchronization:** Synchronization Tools, The Critical-Section Problem and Solutions, Semaphores, Classic Problems of Synchronization. **Deadlocks:** Overview, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT – III

Memory Management

Memory Management: Main Memory: Contiguous Memory Allocation, Paging, Structure of the Page Table, Swapping, Intel 32- and 64-bit, Architectures, ARMv8 Architecture, Segmentation, Page Fault Handling, **Virtual Memory:** Overview,

Demand Paging, Copy-On-Write, Page Replacement, Allocation of Frames, Thrashing, Memory Compression, Allocating Kernel Memory.

UNIT – IV

Storage Management

Mass-Storage Structure, Overview of Mass-Storage Structure, HDD Scheduling, NVM Scheduling, Error Detection and Correction, Storage Device Management, Swap-Space Management, Storage Attachment, RAID Structure, I/O Systems: Overview, I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Requests to Hardware Operations, STREAMS.

UNIT – V

File System

File-System Interface, File Concept, Access Methods, Directory Structure, Protection, Memory-Mapped Files, File-System Implementation, File-Structure, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery, File-System Internals: File Systems, File-System Mounting, Partitions and Mounting, File Sharing, Virtual File Systems, Remote File Systems, Consistency Semantics, Advance Topics: Security in Operating System, Overview of Virtual Machines, Benefits and Features, Types of VMs and Their Implementations, Network and Distributed Operating Systems: Advantages, Design Issues, Network Structure, Communication Structure.

Reference Books

1. Operating System Concepts by Abraham Silberschatz, Peter B. Galvin, Greg Gagne, 10th Ed., Wiley, 2018.
2. Modern Operating Systems, Fourth Edition, Global Edition, Andrew S. Tanenbaum, Herbert Bos.
3. Operating Systems by D.M. Dhamdhare, Tata McGraw Hill 2nd edition.
4. Operating Systems (5th Ed) – Internals and Design Principles by William Stallings, Prentice Hall India, 2000.

CTMTCSE SIV P5: Cryptography

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 00 | 00 | 02 | 02 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To understand the cryptography and cipher texts
2. To give the understanding of the functionality symmetric and asymmetric Encryption Method.
3. To describe the working various hash functions.
4. To understand requirement of access control and its types.
5. To use steganography in various applications.

UNIT – I

Introduction to Cryptography

Introduction to Cryptography, Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Classical Cipher - Shift Cipher, Substitution Cipher, Affine Cipher, Vigenere Cipher, Hill Cipher, Permutation Cipher, Stream Ciphers, Cryptanalysis of Classical Ciphers, Symmetric Block Encryption Algorithms: The Data Encryption Standard (DES), The Advanced Encryption Standard (AES), Stream Ciphers and RC4, Cipher Block Modes of Operation.

UNIT – II

Public Key Cryptography

Public-Key Cryptography Principles, Public-Key Cryptography Algorithms: RSA, Digital Signatures ElGamal Digital Signature Scheme and its Security, Digital Signature Algorithm(DSA), Key Management: Diffie Hellman Algorithm. Kerberos, X.509, Directory Authentication Service, Public Key Infrastructure.

UNIT – III

Cryptography Hash Functions

Identification versus authentication versus authorization, **Approaches to Message Authentication:** The multifactor authentication, **Secure Hash Functions:** Hash Functions and Data Integrity, Iterated Hash Functions- Merkel Damgard Construction, Secure Hash Algorithm (SHA), Message Authentication Codes, Security of Hash Functions-The Random Oracle Model, Authenticated Encryption, Signature and Hash Functions.

UNIT – IV

Authorization

Access Control Requirements, Types of Access Control: Mandatory Access Control, Discretionary Access Control, Role-based Access Control, Attribute-based Access Control, Session management.

UNIT – V

Steganography

Introduction and History, Need of Data Hiding, Cryptography V/S Steganography, Steganography Techniques, Network Steganography, Steganography Tools, Steganography in Smart Phones, Various Steganography Algorithms.

Reference Books

1. William Stallings, "Cryptography and Network Security", Pearson Education
2. Behrouz Forouzan, "Cryptography and Network Security", TMH Publication.
3. Nina Godbole, "Information Systems Security", Wiley Publication.
4. William Stallings, "Network Security Essentials: Applications and Standards", Pearson Education
5. Stinson, Douglas R., "Cryptography: theory and practice", Chapman and Hall/CRC,
6. Forouzan, Behrouz A., "Cryptography & network security", McGraw-Hill, Inc.
7. Schneier, Bruce, "Applied cryptography: protocols, algorithms, and source code in C", John Wiley & sons.
8. Modern Cryptography: Theory and Practice by Wenbo Mao
9. Steganography in Digital Media: Principles, Algorithms, and Applications by Jessica Fridrich
10. Investigator's Guide to Steganography by Gregory Kipper
11. Hiding in Plain Sight: Steganography and the Art of Covert Communication by Eric Cole
12. Data Hiding: Exposing Concealed Data in Multimedia, Operating Systems, Mobile Devices and Network Protocols by Michael T. Raggio and Chet Hosmer
13. Noiseless Steganography: The Key to Covert Communications by Abdelrahman Desoky.

CTMTCSE SIV P6: [.dot] Net Programming

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 00 | 00 | 02 | 02 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To understand basic concepts of .Net Programming including its framework and life cycle.
2. To understand OOP in .Net.
3. To explore knowledge of Application Programming
4. To work with Database and its controls, also to manipulate data with SQL.
5. To be able to generate crystal reports

UNIT – I

Introduction to .Net Programming

Introduction to .NET Framework, Features / Advantages, CLR, CTS and CLS, BCL / FCL / Namespaces, Assembly and MetaData, JIT and types, Managed Code and Unmanaged Code, Introduction to .NET Framework and IDE versions, Different components of IDE, Types of Projects in IDE (Console, Windows, Web, Setup, etc.), Data Types (Value Type & Reference Type), Boxing and UnBoxing, Operators (Arithmetic, Relational, Bitwise, etc.), Arrays (One Dimensional, Rectangular, Jagged), Decisions (If types and switch case), Loops (for, while, do..while, foreach) Assembly, Components of Assembly, Private and Shared Assembly, Garbage Collector, JIT compiler, Namespaces, Collections.

UNIT – II

Object Oriented Concepts

Concept of Class, Object, Encapsulation, Inheritance, Polymorphism, Creating Class and Objects, Methods with “ref” and “out” parameters, Static and Non-Static Members Constructors, Overloading Constructor, Method and Operator, Inheritance, Sealed Class & Abstract Class, Overriding Methods, Interface inheritance, Creating and using Property, Creating and using Indexer, Creating and using Pointers (unsafe concept), Creating and using Delegates (Single / Multicasting), Creating and using Events with, Event Delegate, Collections (ArrayList, HashTable, Stack, Queue, SortedList) and their differences.

UNIT – III

Application Development

Application development using Controls - Button, Label, Link Label, Radio Button, Check Box, Text Box, Rich Text Box, List Box, Checked List Box, List View, Web forms - Menus and ToolBars, Validation controls, SDI and MDI applications, Window application, Master page, Themes, Skin, Introduction to CSS..NET server controls- Types of control,.NET state management engine, Web.config and global.asax files, Caching, Navigation controls.

UNIT – IV

Database Programming with ADO.NET

Concept of Connected and Disconnected Architecture, Data Providers in ADO.NET Connection Object, Connected Architecture: Command, DataReader, Disconnected Architecture: DataAdapter, DataSet, DataTable, DataRow, DataColumn, DataRelation, DataView, Data Binding, GridView Programming.

UNIT – V

User Controls, Crystal Reports, Setup Project

Creating User Control with: Property, Method, Event, Using User Control Projects as component, Creating Crystal Reports, Types of Reports, Report Sections, Formula, Special Field and Summary in Report, Types of Setup Projects, Creating Setup Project, File System Editor, User Interface Editor, Launch Conditions Editor.

Reference Books

1. Pro C# 5.0 and .NET 4.5 Framework (By: Andrew Troelsen)
2. Head First C# - (By: Jennifer Greene, Andrew Stellman)
3. C# 5.0 Unleashed - (By: Bart De Smet)
4. Adaptive Code Via C# (By: Gary McLean Hall)
5. C#.NET Programming Black Book - steven holzner –dreamtech publications
6. Introduction to .NET framework - Wrox publication
7. Microsoft ADO. Net - Rebecca M. Riordan, Microsoft Press

CTBTCSE SIV L1: Computer Networks Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 |

Experiments / Practical's to support the associated theory course.

CTBTCSE SIV L2: Microprocessor and Microcontroller Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 |

Experiments / Practical's to support the associated theory course.

CTBTCSE SIV L3: Operating System Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 |

Experiments / Practical's to support the associated theory course.

CTBTCSE SIV L4: Cryptography Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 |

Experiments / Practical's to support the associated theory course.

CTBTCSE SIV L5: [dot] Net Programming Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 |

Experiments / Practical's to support the associated theory course.

SEMESTER - V

CTMTCSE SV P1: Advance Computer Networks

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 03 | 00 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To study about routing algorithm.
2. To study network enumeration tools and techniques.
3. To study the implementation of firewall and routing protocols.
4. To learn key application layer protocols.
5. To learn network management.

UNIT – I

Networking

IP Addressing and Masking, Virtual Circuits v/s Datagram Circuits. Routing Algorithms –, Distance Vector Routing, Link State Routing, Broadcast Routing, Shortest Path Algorithm, Flooding, Multicast Routing, Anycast Routing, Congestion Control Algorithms, Tunnelling, OSPF, BGP and Internet Multicasting, Traffic Engineering, Multimedia over Internet.

UNIT – II

Transport Layer

Introduction and transport layer services, Multiplexing and Demultiplexing, Connectionless transport (UDP), Principles of reliable data transfer, Connection-oriented transport (TCP), Congestion control, TCP congestion control.

UNIT – III

Application Layer

Application Layer: Domain Name System, Dynamic Host Configuration Protocol, WWW and HTTP Email – Architecture, Email Security - PGP, Telnet, FTP Services, SMTP, POP, IMAP, MIME.

UNIT – IV

Network Enumeration

Network enumeration with nmap: ping scan, TCP connect scan, TCP SYN Scan, OS Fingerprinting, DNS Enumeration with nslookup, natcat, ICMP debugging tools.

UNIT – V

Network Management and Security

Network Management: Introduction, SNMP, ASN.1, etc. **Network Security:** Message Confidentiality, Message Integrity, Message Authentication, Message Nonrepudiation, Digital Signature, Communication Security, Email Security, Web Security, Social Issue, Firewalls and its types, IDS/IPS, Encrypted Tunnels (VPN, SSL/TLS).

Reference Books

1. Advance Computer Network, By Dayanand Ambawade, Dr. Deven shah, Prof. Mahendra Mehra, Wiley India
2. CCNA Intro – Study Guide – Todd Lammle, Sybex
3. Data Communications and Networking By Behrouz A. Forouzan, 5th Edition
4. Computer Network by Andrew S. Tanenbaum and David J. Wetherall, 5th Edition
5. Computer Networking- A Top-Down approach (7th edition), Kurose and Ross, Pearson
6. Nmap 6: Network Exploration and Security Auditing Cookbook, Packt publishing
7. Computer Networks- A Top-Down approach, Behrouz Forouzan, McGraw Hill
8. TCP/IP Protocol Suite (4th edition), Behrouz Forouzan, McGraw Hill

CTMTCS SV P2: Web Development Technology

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 01 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. Know the techniques for improving the accessibility of an HTML document.
2. Know the techniques involved to support reach web development application.
3. Students understand the web development and database technology.
4. To give the fundamental skills needed to understand the concepts of web development.
5. To learn fundamentals of client and server-side scripting.

UNIT – I

Introduction to Web Technology

Introduction to WWW and Web Browsers, Introduction to Web Servers and its need, HTTP protocol and its methods, Web development tools & techniques.

UNIT – II

Basics of HTML, CSS & Bootstraps

HTML: Introduction to HTML, HTML elements, tags and attributes, HTML page structure, HTML data formatting tags (header, paragraph, bold, italic, superscript, subscript, line breaks, horizontal lines, center), nested elements in HTML, HTML comments, special characters in HTML, HTML tables, HTML lists, HTML media (image, video, audio), HTML hyperlinks, forms in HTML, HTML APIs, HTML 5 tags & validation. **CSS:** Introduction to CSS and its importance, types of CSS and their structures, CSS styles, CSS background rules, colours and properties, CSS margins, CSS padding list, CSS positioning, CSS2, CSS3, CSS gradients, animations using CSS. **Bootstraps:** Introduction to Bootstraps, selector components in bootstraps.

UNIT – III

JavaScript: Client-Side Scripting

Introduction to Client-Side Programming, Introduction to JavaScript and its Syntax, types of JavaScript, JavaScript variables, array, functions, conditions, loops, objects & DOM, JavaScript inbuilt functions, JavaScript Validations, regular expressions in JavaScript, Event Handling with JavaScript, Call-backs in JavaScript.

UNIT – IV

PHP: Server-Side Programming & MySQL

Introduction to Server-Side Programming, Client-Side v/s Server-Side Programming, Introduction to PHP, Structure of PHP, **PHP Syntax:** variables, operators, conditionals, looping, PHP Arrays and functions, objects, Session Management in PHP, File uploads & downloads in PHP, Exception Handling in PHP, **MySQL:** Basics MySQL commands, PHP functions – database connectivity, CRUD operations using PHP.

UNIT – V

Advance Web Development Concepts

JQuery & AJAX: Introduction to JQuery, JQuery Syntax, JQuery Selectors, Handling Events using JQuery, Special Effects using JQuery, DOM traversal using JQuery, Introduction to AJAX and its need, Asynchronous Web request handling using AJAX. Introduction to MVC framework, Components of MVC framework, PHP MVC Framework: CodeIgnitor, **Overview of Web Application Framework based languages:** NodeJS, Angular, React.

Reference Books

1. Learning PHP, MySQL & JavaScript with JQuery, CSS & HTML5 by Robin Nixon, O'Reilly Publication, Fifth Edition.
2. Learning from jQuery by Callum Macrae, O'Reilly Publication, First Edition.
3. HTML and CSS: Design & Build Websites by Jon Duckett, Wiley Publications.
4. Web Development for Beginners: Learn HTML/CSS/Javascript Step by Step with This Coding Guide, Programming Guide for Beginners, Website Development by White Belt Mastery
5. Introduction to Web Development using HTML 5 by Kris Jamsa, Jones & Bartlett Publication.
6. The Complete Reference PHP by Steven Holzner, McGraw Hill Education.
7. Internet and World Wide Web How to program, P.J. Deitel & H.M. Deitel, Pearson

CTMTCS SV P3: Computer Programming with Python

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 00 | 00 | 02 | 02 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To list various features of python, data types and operators in Python.
2. To explain indexing and slicing on array and string.
3. To be able to differentiate list, tuple and dictionary by performing various operations on it and determine which data structure best suits the real-life scenario.
4. To be able to use regular expression to extract the meaningful information from the data.
5. To test any program for its correctness and be able to use exception handling and prepare outline and convert program into structured form using UDF.

UNIT – I

Introduction to Python

Introduction of Python: features, executing program, memory management, garbage collection, installing python. **Data Types:** comments, built-in data types, sequences, sets, literals, user-defined data types, constants, identifiers, reserved words, naming convention. Operators, Input and Output statements, Command line arguments.

UNIT – II

Looping and Control Structure, Arrays, Strings

Condition Statements: if, if-else, nested if-else, **Looping:** for, while, nested loops, **Control Structure:** break, continue, pass, **Array:** Creating, importing, index, processing, types of array, different ways of creating array, operations on array, attributes of an array, Multi-dimensional arrays and operations on it – indexing, slicing. **String:** Creating Strings and operations with strings, Characters.

UNIT – III

List, Tuple, Dictionary, Regular Expression

Lists and Tuples: Creating List and Tuples, Operations on list and tuples, **Dictionaries:** Operation on dictionaries, dictionary methods, Sorting elements, Conversion of list and strings to dictionary, passing to function, ordered dictionary,

Regular Expression: regular expression module, RegEx functions, RegEx Meta Characters, RegEx special sequences, RegEx sets.

UNIT – IV

Function, Exception Handling, Modules, File Handling

Functions: Defining, Calling, returning result, pass by object, formal and actual arguments, default argument, variable length argument, passing group of elements, anonymous functions, functional decorators, generators. **Modules:** Importing module, Math module, Random module, packages, composition, **Exception:** Errors, Exceptions handling, types of exception, assert statement, except block, user-defined exception, **Files:** types of files, opening and closing, working with text files, various operations with files, parsing of xml and json files, random accessing of binary files, zipping and unzipping files, Data collection from Public API.

UNIT – V

Object Oriented Programming using Python

OOP: Introduction to OOPs, problems in procedure-oriented approach, **Classes and objects, Inheritance & Polymorphism:** Constructors in Inheritance, Overriding Super Class Constructors and Methods, The super () Method, Types of Inheritance, Single Inheritance, Multiple Inheritance, Method Resolution Order (MRO), Polymorphism, Duck Typing Philosophy of Python, Operator Overloading, Method Overloading, Method Overriding, **Abstract classes and interfaces:** Abstract Method and Abstract Class, Interfaces in Python, Abstract Classes vs. Interfaces.

Reference Books

1. “Core Python Programming” by Dr. R. Nageswara Rao – 2017 Edition, Dreamtech Press
2. “Learn Data Analysis with Python” by A.J.Henley, Dave Wolf, APress
3. “Fundamentals of Python – First Programs”, Kenneth A. Lambert, CENGAGE publication.
4. “Introduction to Computation and Programming Using Python” by John V Guttag, PHI publication.
5. “Python Projects” by Laura Cassell, WROX
6. “Beginning Python from Novice to Professional” by Magnus Lie Hetland- APress

CTMTCS SV P4: Theory of Computation

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 01 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To understand the concepts and techniques of theoretical computer science.
2. To identify different formal languages and their relationships.
3. To classify and construct grammars for different languages and vice-versa.
4. To build finite automata, push down automata and Turing machine.
5. To understand the compute functions.

UNIT – I

Mathematical Theory Sets and Computation

Review of Mathematical Theory: Sets, Functions, Logical statements, Proofs, Relations, Languages, Principal of Mathematical Induction, Strong Principle, Recursive Definitions, Structural Induction. Introduction: Theory of Computation, Notion of formal language, Language Membership Problem.

UNIT – II

Finite Automata & Regular Expressions

Finite Automata: Application of Finite Automata, Automata with output - Moore machine & Mealy machine, Finite Automata, Memory requirement in a recognizer, Deterministic Finite Automata, Non-Deterministic Finite Automata, Various Conversions, Minimization of Finite automata, **Regular Expressions:** Definition, Regular Languages, union- intersection and complement of regular languages, Kleene's Theorem, Regular and Non-Regular Languages, Properties of Regular Languages, Pumping Lemma and its uses.

UNIT – III

Context Free Grammar & Push Down Automata

Context free grammar (CFG): Derivation, parse trees, Unions Concatenations and Kleene's of Context free language, Regular Grammar for Regular Language, Derivations and Ambiguity, Unambiguous CFG and Algebraic Expressions, Baconer Form (BNF), Normal Form – CNF. Pushdown Automata, CFL and NCFL: Definitions, Deterministic PDA, Equivalence of CFG and PDA & Conversion, Pumping lemma for CFL, Intersections and Complements of CFL, Non-CFL.

UNIT – IV

Turing Machine

Turing Machine (TM): TM Definition, Model of Computation, Turing Machine as Language Acceptor, TM that Compute Partial Function, Church Turning Thesis, Combining TM, Variations of TM, Non-Deterministic TM, Universal TM, Recursively and Enumerable Languages, Context sensitive languages and Chomsky hierarchy

UNIT – V

TM Functions

Computable Functions: Partial - Total - Constant Functions, Primitive Recursive Functions, Bounded Minimization, Regular function, Recursive Functions, Quantification, Minimalization, and μ -Recursive Functions, All Computable Functions Are μ -Recursive, **Undecidability:** A Language That Can't Be Accepted, and a Problem That Can't Be Decided , Non Recursive Enumerable (RE) Language – Undecidable Problem with RE – Undecidable Problems about TM – Undecidable Problems Involving Context-Free Languages, Post's Correspondence Problem, The Class P and NP.

Reference Books

1. Introduction to Languages and the Theory of Computation, 4th by John Martin, Tata Mc Graw Hill
2. An introduction to automata theory and formal languages By Adesh K. Pandey, Publisher: S.K. Kataria & Sons
3. Introduction to computer theory By Deniel I. Cohen , Joh Wiley & Sons, Inc
4. Computation: Finite and Infinite By Marvin L. Minsky Prentice-Hall
5. Compiler Design By Alfred V Aho, Addison Wesley
6. Introduction to the Theory of Computation By Michael Sipser
7. Automata Theory, Languages, and Computation By John Hopcroft, Rajeev Motwani, and Jeffrey Ullman
8. J Hopcroft, JD Ullman, R Motwani, Introduction to Automata Theory, Languages and Computation, 3rd Ed., Pearson, 2008.
9. M Sipser, Theory of Computation, Brooks-Cole, 2008.

CTMTCS SIV P5: Wireless Communication & Mobile

Computing

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 01 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To understand the mobile and wireless network systems.
2. To understand underlying concepts of GSM & GPRS.
3. To understand mobile computing technologies.
4. To understand wireless protocol standards.
5. To implement various error coding techniques.

UNIT – I

Introduction to Wireless Communication Systems

Introduction to wireless communications: Evolution of Mobile Radio Communications, Paging Systems, telephone systems, cellular systems, satellite systems, modern wireless communication systems: 2G, 3G, 4G, 5G networks.

Communication Networks: LAN, MAN, WAN.

UNIT – II

Introduction to Mobile Computing Technologies

Mobile Computing and its need, Introduction to Bluetooth Protocol, Bluetooth Protocol Stack, Radio Frequency Identification (RFID) – Types of RFID, Components of RFID, Introduction to Mobile IP and its advantage, Introduction to GSM – features and architecture, call routing in GSM, GSM authentication & security.

UNIT – III

Wireless Systems - 1

Introduction to General Packet Radio Service (GPRS), GPRS network architecture, GPRS network operation, GPRS Application and Limitation.

UNIT – IV

Wireless Systems - 2

Introduction to WAP (Wireless Access Protocol), WAP protocol Stack, Multiple Access Scheme – CDMA, FDMA, TDMA, SDMA, Principle of CDMA, CDMA Architecture, CDMA channels, CDMA security.

UNIT – V

Wireless Systems & Standards

Introduction to Wireless LAN (WLAN), WiMAX, AdHoc Wireless Networks – Data Networks, Home Networks, Device Networks, Sensor Networks, VoIP Communication Protocol, IEEE 802.16 Wireless Access Standards, IEEE 802.11 architecture and services, IEEE 802.11- medium access control, Physical Layer.

Reference Books

1. Wireless Communications & Network, Second Edition, William Stallings by Pearson.
2. Mobile Computing Technology Applications, and service creation by Asoke K Telukder, Roopa R. Yavagal, TMH.
3. Wireless Communications, Principles and Practices by T. S. Rappaport, Pearson Education India.
4. Wireless Communications by Andrea Goldsmith, Cambridge University Press.
5. Fundamentals of Wireless Communication by Pramod Viswanath, Cambridge University Press.

CTMTCS SV P6 EL1: Big Data

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 00 | 00 | 02 | 02 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To understand the underlying concepts of Big Data.
2. To have knowledge on accessing, storing and manipulating huge datasets from different resources.
3. Apply analytics on Structured, Unstructured Data.
4. To understand the working environments of various data processing engines.
5. To have a knowledge of R and its use in Data Analytics.

UNIT – I

Introduction to Big Data

Digital Data, Introduction to Big Data: Definition of Big Data, Evolution of Big Data, Needs and Challenges of Big Data, Types of Digital Data, Sources of Digital Data, Characteristics of Data, Traditional vs. Big Data. Data Analytics, Types of Data Analytics. Data Visualization Techniques.

UNIT – II

Hadoop & Hadoop Distributed File System

Introduction to Hadoop, History of Hadoop, Need of Hadoop, Data Analysing using Hadoop, Introduction to HDFS – Data Storage in HDFS, HDFS Architecture, Data Processing Frameworks in Hadoop – YARN & MapReduce.

UNIT – III

Introduction to R Language

Introduction to R Language, Advantages of R over Programming languages, Data Types in R, working with directory in R, Expressions – Variables – Functions in R, Reading & Exporting Data in R, Linear and Logistic Regression in R, Data Visualization using R, ARIMA Model.

UNIT – IV

Modern Web Data Techniques & Frameworks

Excel & its use in Data Analytics, Introduction to HBase, Hbase v/s RDBMS, Introduction to PIG and its services, Introduction to ZooKeeper and its services.

UNIT – V

Hadoop Security and Administration

Security: Kerberos, Delegation tokens, Hadoop Administration: Routine administration processes, commissioning and decommissioning nodes

Reference Books

1. Hadoop: The Definitive Guide, by Tom White, O'Reilly Media.
2. Data Analytics with Hadoop: An Introduction for Data Scientist by Benjamin Bengfort, Jenny Kim, O'Reilly Media.
3. Hadoop for Dummies by Dirk DeRoos, Wiley Publication.
4. Data Analytics using R by Seema Acharya, McGraw Hill Education
5. Big Data Analytics with R and Hadoop by Vignesh Prajapati, Packt Publication.

CTMTCS SV P6 EL2: Cloud Computing

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 00 | 00 | 02 | 02 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. Acquire knowledge of important concepts, key technologies, strengths, and limitations of cloud computing along with its state-of-the-art applications.
2. Ability to understand the available cloud infrastructure.
3. Identify and evaluate services being offered by different cloud providers.
4. Ability to identify, analyze and remediate cloud security breaches by learning and implementing real-world scenarios.
5. Design, develop and deploy cloud-based applications.

UNIT – I

Introduction to Cloud Computing

Introduction to cloud computing, Feature Characteristics and Components of Cloud Computing, Challenges, Risks and Approaches of Migration into Cloud, Future of the Cloud, Cloud services and technologies, Research challenges, Cloud computing reference architecture, Layer and Types of Clouds.

UNIT – II

Cloud Service Models

Introduction, Service models and deployment models, PAAS – Working Principle, Example, SAAS – Working Principle, Example, IAAS–Working Principle, Examples, Service Level Agreements (SLAs), Billing& Accounting, Comparing Scaling Hardware, Managing Data. Datacentre Design and Interconnection Network, Case study on open source and commercial clouds.

UNIT – III

Cloud Computing Architecture and Storage

Load Balancing and Virtualization, Level of Virtualization: Full virtualization, Para virtualization, Partial virtualization, Comparison of virtualization levels, Understanding Hyper visors, Understanding Machine Imaging, Porting Applications, Virtual Machines Provisioning and Manageability Virtual Machine Migration Services, Virtual Machine Provisioning and Migration in Action, Provisioning in the Cloud Context, Virtualization of CPU, Memory, I/O Devices, Virtual Clusters and

Resource management, Virtualization for Data Center Automation.

UNIT – IV

Cloud Computing Architecture and Storage

Cloud Infrastructure and Cloud Resource Management: Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources. Adminstrating the Clouds, Cloud Management Products, Emerging Cloud Management Standards.

UNIT – V

Advance Cloud Service Providers

Introduction to OpenStack, Eucaluptus, Windows Azure, CloudSim, EyeOs, Aneka, Google App Engine. Cloud based case studies (service overview, design soluation, emerging market).

Reference Books

1. Nikos Antonopoulos, Lee Gillam: "Cloud Computing: Principles, Systems and Applications", 2nd Edition, Springer, 2012.
2. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski: "CloudComputing: Principles and Paradigms", 1st Edition, Wiley, 2011.
3. Toby Velte, Anthony Velte, Cloud Computing: A Practical Approach, McGraw-Hill Osborne Media.
4. Ronald L. Krutz, Russell Dean Vines: "Cloud Security: AComprehensive Guide to Secure Cloud Computing", 1st Edition, Wiley-India, 2010.
5. Barrie Sosinsky: "Cloud Computing Bible", 1st Edition, Wiley-India, 2010.
6. George Reese, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, O'Reilly Publication.
7. Tim Mather, Subra Kumara swamy, Shahed Latif, "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance", 1st Edition, O'Reilly Media, 2009.

CTBTCSE SV L1: Advance Computer Networks

Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|-----------|------------------------|-------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | Practical | | | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 | |

Experiments / Practical's to support the associated theory course.

CTBTCSE SV L2: Web Development Technology Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 |

Experiments / Practical's to support the associated theory course.

CTBTCSE SV L3: Computer Programming with Python **Laboratory**

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 |

Experiments / Practical's to support the associated theory course.

CTBTCSE SV P6 EL1: Big Data Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 |

Experiments / Practical's to support the associated theory course.

CTBTCSE SV P6 EL2: Cloud Computing Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 |

Experiments / Practical's to support the associated theory course.



Semester - VI

CTMTCS SVI P1: Modern Software Engineering

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 01 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To develop a broad understanding of each stage of software engineering life cycle, viz. communication, planning, analysis, design, construction, and deployment.
2. To understand the concepts of software Engineering
3. To understand how to manage user's Requirement
4. To understand how to Analyze, Design, Build and test software
5. To understand agile methodology.

UNIT – I

Introduction to Software and Modern Software Engineering

The Evolving Role of Software, Software: A Crisis on the Horizon and Software Myths, Software Engineering: A Layered Technology, Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Process Models, Agile Process Model, Component-Based Development, Process, Product and Process.

UNIT – II

Agile Development and Managing Software Project

Agility and Agile Process model, Extreme Programming, Other process models of Agile Development and Tools. Software Metrics (Process, Product and Project Metrics), Software Project Estimations, Software Project Planning (MS Project Tool), Project Scheduling & Tracking, Risk Analysis & Management (Risk Identification, Risk Projection, Risk Refinement , Risk Mitigation)

UNIT – III

Requirement Analysis, Specification, Software Design & Coding

Understanding the Requirement, Requirement Modelling, Requirement Specification (SRS), Requirement Analysis and Requirement Elicitation, Requirement Engineering. Design Concepts and Design Principal, Architectural Design, Component Level Design (Function Oriented Design, Object Oriented

Design) (MS Visio Tool), User Interface Design, Web Application Design. Coding Standard and coding Guidelines, Code Review, Software Documentation.

UNIT – IV

Software Testing – Concepts, Issues & Techniques

Testing Techniques and Test Case, Test Suites Design, Testing Conventional Applications, Testing Object Oriented Applications, Testing Web and Mobile Applications, Testing Tools (Win runner, Load runner). Verification and Validation, Failure, Error, Fault, and Defect, Objectives of Testing, Testing Activities, Test Case Selection White-Box and Black Box Test Planning and design, Test Tools and Automation, Power of Test. Test Team Organization and Management-Test Groups, Software Quality Assurance Group, System Test Team Hierarchy, Team Building. System Testing - System Integration Techniques-Incremental, Top Down Bottom Up Sandwich and Big Bang, Software and Hardware Integration, Hardware Design Verification Tests, Hardware and Software Compatibility Matrix Test Plan for System Integration. Built- in Testing. functional testing - Testing a Function in Context. Boundary Value Analysis, Decision Tables. acceptance testing - Selection of Acceptance Criteria, Acceptance Test Plan, Test Execution Test. software reliability - Fault and Failure, Factors Influencing Software, Reliability Models

UNIT – V

Software Quality and Quality Assurance

Software Quality – People’s Quality Expectations, Frameworks and ISO-9126, McCall’s Quality Factors and Criteria – Relationship. Quality Metrics. Quality Characteristics ISO 9000:2000 Software Quality Standard. Maturity models- Test Process Improvement, Testing Maturity Model. Quality Assurance - Root Cause Analysis, modelling, technologies, standards and methodologies for defect prevention. Fault Tolerance and Failure Containment - Safety Assurance and Damage Control, Hazard analysis using fault-trees and event-trees. Comparing Quality Assurance Techniques and Activities. QA Monitoring and Measurement, Risk Identification for Quantifiable Quality Improvement. Case Study: FSM-Based Testing of Web-Based Applications.

Reference Books

1. Modern Software Engineering - Doing What Works to Build Better Software Faster, David Farley, Addison-Wesley, 2021,
2. An Introduction to modern software engineering, Ian Sommerville, Pearson, 2021

3. The essentials of Modern Software Engineering, Ivar Jacobson, Harold “Bud” Lawson, Pan wei Ng, Paul E. McMohan, Michael Goedicke
4. Software Engineering- A Practitioner’s Approach, 9th Edition, Roger S. Pressman, Bruce R. Maxim, McGraw-Hill International, 2020
5. Software Engineering Ian Sommerville Pearson education Asia
6. Software Engineering Pankaj Jalote A Precise Approach Wiley
7. Fundamentals of software Engineering Rajib Mall Prentice Hall of India
8. Software Testing and Quality Assurance: Theory and Practice, Kshirasagar Naik, Priyadarshi Tripathy, Wiley Publication

CTMTCS SVI P2: Essentials of Cyber Security

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 02 | 01 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To understand the underlying concepts of Cyber Security.
2. To understand the basic of cyber-attack taxonomy.
3. To study about acts, laws and policies.
4. To understand the attack mitigation techniques.
5. To study about various cybercrime reporting portals.

UNIT – I

Introduction to Cyber Security

Introduction to the Cyberspace, Definition of Cyber Security, History of Cyber Attacks, Requirement of Cyber Security in industry and Government, Advantages of Cyber Security, Introduction to Information Security, Difference between Cyber Security and Information Security, National and International Cyber Security / Cyber Crime handling bodies, Contact to cyber-crime/cyber incident reporting portal like cybercrime.gov.in, CERT-In, CEIR.

UNIT – II

Basics of Cyber Security and Cyber Attacks

Introduction to C-I-A and A-A-A of information security, Introduction to threat, vulnerability, attack vector; Anatomy of an attack, Financial Frauds with various types of Ponzi schemes, Spam mail, Phishing and Spear-Phishing mail, Malware and Ransomware Attacks, Wishing Attack, Smishing Attack, Identity Theft, Social Engineering Attacks, Wireless Attacks, etc with their case study(s). Network Reconnaissance & Sniffing Tools: nmap, tcpdump and Wireshark.

UNIT – III

Personal Security Measures

Mobile Phone Security Measures with password, permission, various internal configurations and genuine applications, Personal Computer/Laptop Security with multiple level password, firewall, wireless configuration, drive encryption, anti-virus, patches and updates along with other necessary configurations, Safe usage of internet and its various services, Safeguard the digital profile (social media

accounts), Secure use of all the digital information transfer and digital transactions (with UPI, Wallet, ATM, E-Banking, Credit/Debit Cards, etc) Cyber hygiene with do's and don'ts of internet and cyberspace, CERT-In guidelines.

UNIT – IV

Cyber Laws & Regulations

'Indian IT Act 2000' with amendments of 2008, 2011 and sections related to the types of cyber-crime with its penalties, 'Indian IT Act 2000' in conjunction with 'Indian Penal Code' and 'Indian Evidence Act', Introduction to 'National Cyber Security Policy', Recent RBI Guidelines on cyber security, Introduction to 'The Personal Data Protection Bill 2019', Important aspects from 'United Nations Convention On Cooperation In Combating Information Crimes'.

UNIT – V

Cyber Attacks & Mitigation

Introduction to Deepweb, Darkweb (Silkroad case study), Surfaceweb, Cyber Attacks like DoS, DDoS, Brute-Force Attack, steganography, Man in the middle, Vishing, etc. and its various possible mitigation techniques, Virustotal, Whois, IP tracing, IP location, Understanding and importance of logs in cyber security, How and What to preserve in case of any cybercrime complaint filing?, CERT-In guidelines for safety and security, Various Schemes and advisory of 'Cyber and Information Security (C&IS) Division' under the MHA, Govt. of India

Reference Books

1. Computer Security Principles and Practice (3rd Edition) by William Stallings and Lawrie Brown.
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley.
3. Cyber Security and Cyber Laws Paperback – 2018 by Alfred Basta, Nadine Basta , Mary Brown , Ravinder Kumar, publication Cengage.
4. Nmap Essentials by David Shaw, Packt Publication.
5. National Cyber Security Policy, INDIA
6. IT Act 2000
7. Data Protection Bill, 2019
8. CERT-IN Guidelines
9. ISEA Awareness Book

CTMTCS SVI P3: Compiler Design

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | |
| 02 | 01 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To provide an understanding of the fundamental principles in compiler design.
2. To study about various lexical analyzer.
3. To study about various syntactical analyzers.
4. To understand the concepts of error handling in compilers.
5. To study the concepts of code generation and optimization.

UNIT – I

Basics of Compiler Design

Introduction to Compiler, Translator, Interpreter and Assembler. Importance of Compiler, Language processor, Applications of language processors, Definition-Structure-Working of compiler, the science of building compilers, Difference between Compiler & Interpreter, Compilation of source code into target language, Cousins of compiler, Types of compiler, Overview of A simple traditional modular compiler/interpreter.

UNIT – II

Lexical Analysis

Introduction, The Role of the Lexical Analyzer, Specification of Tokens, Recognition of Tokens, Input Buffering, elementary scanner design and its implementation (Lex), Applying concepts of Finite Automata for recognition of tokens

UNIT – III

Syntax Analysis

Introduction, parsing methods. Lexical versus syntactic analysis, Understanding Parser and CFG (Context Free Grammars), Left Recursion and Left Factoring of grammar Top Down and Bottom up Parsing Algorithms, Operator-Precedence Parsing, LR Parsers, Using Ambiguous Grammars, Parser Generators, Automatic Generation of Parsers. Syntax-Directed Definitions, Construction of Syntax Trees, Bottom-Up Evaluation of S-Attributed Definitions, L-Attributed Definitions, syntax directed definitions and translation schemes

UNIT – IV

Error Handling

Error Handling: Error handling in lexical analyzers, Error handling in LL parsers, Error handling in LR parsers, Error Detection & Recovery, Ad-Hoc and Systematic Methods, Run-Time Environments: Source Language Issues, Storage Organization. Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management,

UNIT – V

Code Generation & Optimization

Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Translation of Expressions, Type Checking, Syntax Directed Translation Mechanisms, Attributed Mechanisms and Attributed Definition. **Code Generation and Optimization:** Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Machine dependent optimization, Machine independent optimization Error detection of recovery

Reference Books

1. Modern Compiler Design - Dick Grune, Henri E. Bal, Jacob, Langendoen, WILEY India
2. Principles of Compiler Design, V. Raghavan, McGrawHill
3. The Theory And Practice Of Compiler Writing - Trembley J.P. And Sorenson P.G. McGraw-Hill
4. Introduction to Compilers and Language Design by Douglas Thain
5. Compiler, Principles, Techniques and Tools by Alfred Aho, Monica Lam, Ravi Sethi and Jeffrey D. Ullman, PEARSON India

CTMTCS SVI P4: Vocational Skills and Personality

Development

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 02 | 00 | 00 | 02 | 02 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To study about personality traits.
2. To study about success and failures and to overcome them.
3. To learn the presentable way for group discussions
4. To study about attitudes that can be possessed.
5. To understand and explore entrepreneurship domains.

UNIT – I

Introduction

The Contributor Work Ideal In this topic, students explore what is their “ideal” of work - is the ideal to be a “worker” or to be a “contributor”? For example, an employee who has the ideal of a “worker” goes to work to pass time, earn a living, get benefits; in contrast to an employee with the ideal of a “contributor” who wants to make a difference, get things done well, create value for the company.

UNIT – II

Introduction to Personality Development

The concept of Personality, Dimensions of Personality, Theories of Freud & Erickson, Significance of Personality Development. Concept of Success & Failure : Success and hurdles in achieving success, Factors responsible for success and failure, SWOT analysis.

UNIT – III

Soft Skills

Introduction to Soft Skills, Hard skills & soft skills: employability and career Skills, Grooming as a professional with value, Time Management, General awareness of Current Affairs. Self-Introduction-organizing the material, Introducing oneself to the audience, introducing the topic, answering questions, individual presentation practice, presenting the visuals effectively, 5-minute presentations

UNIT – IV

Group Discussion

Introduction to Group Discussion: Participating in group discussions, understanding group dynamics, brainstorming the topic, questioning and clarifying GD strategies, activities to improve GD skills. Interview etiquette, dress code, body language, attending job interviews, telephone/skype interview, one to one interview & panel interview, FAQs related to job interviews.

UNIT – V

Time Management

Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols - understanding career management-developing a long- term career plan-making career changes.

Reference Books

1. Contributor Personality Program textbook cum workbook developed by Illumine.
2. Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015.
3. SOFT SKILLS, 2015, Career Development Centre, Green Pearl Publications.
4. Interact English Lab Manual for Undergraduate Students, OrientBlackSwan: Hyderabad, 2016.
5. E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015
6. Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014
7. S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.

CTMTCS SVI P5: Advance Java Programming

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-----------|------------------------|-----|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | Practical | | | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs | Marks | Hrs | | |
| | | | | | Marks | Hrs | Marks | Hrs | | | | | | |
| 03 | 00 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 | |

Objectives

1. To become familiar with the advanced features of Java Language.
2. To be able to develop Java Network Application using various techniques
3. To be able to develop server-side programs using Servlets.
4. To understand Java server Pages (JSP) technology
5. To develop reusable components using JavaBeans.

UNIT – I

Java Network Programming using Socket

Network Basics and Socket overview, TCP/IP client sockets, URL, TCP/IP server sockets, Datagrams, java.net package Socket, ServerSocket, InetAddress, URL, URLConnection

UNIT – II

JDBC Programming

The JDBC Connectivity Model, Database Programming: Connecting to the Database, Creating a SQL Query, Getting the Results, Updating Database Data, Error Checking and the SQLException Class, The SQLWarning Class, The Statement Interface, PreparedStatement, CallableStatement The ResultSet Interface, Updatable Result Sets, JDBC Types, Executing SQL Queries, ResultSetMetaData, Executing SQL Updates, Transaction Management.

UNIT – III

Servlet API and Overview

Servlet Model: Overview of Servlet, Servlet Life Cycle, HTTP Methods Structure and Deployment descriptor ServletContext and ServletConfig interface, Attributes in Servlet, Request Dispatcher interface **The Filter API:** Filter, FilterChain, Filter Config, **Cookies and Session Management:** Understanding state and session, Understanding Session Timeout and Session Tracking, URL Rewriting.

UNIT – IV

Servlet API and Overview

JSP Overview: The Problem with Servlets, Life Cycle of JSP Page, JSP Processing, JSP and Java Bean, JSP Application Design with MVC, Setting Up the JSP Environment, JSP Directives, JSP Action, JSP Implicit Objects JSP Form Processing, JSP Session and Cookies Handling, JSP Session Tracking JSP Database Access, JSP Standard Tag Libraries, JSP Custom Tag, JSP Expression Language, JSP Exception Handling, JSP XML Processing.

UNIT – IV

Hibernate & Spring Framework

Overview of Hibernate, Hibernate Architecture, Hibernate Mapping Types, Hibernate O/R Mapping, Hibernate Annotation, Hibernate Query Language (HQL). Overview of Spring, Spring Architecture, bean life cycle, XML Configuration on Spring, Aspect – oriented Spring, Managing Database, Managing Transaction.

Reference Books

1. Spring and Hibernate - Santosh Kumar K. - Tata McGraw-Hill Publishing
2. Spring persistence with Hibernate - Paul Tepper Fisher and Brian D. Murphy - Apress
3. Spring 4 and Hibernate 4: Agile Java Design and Development McGraw-Hill Education, 2015
4. Pro Spring - Chris Schaefer, Clarence Ho, and Rob Harrop Apress
5. Black Book “ Java server programming” J2EE, 1st ed., Dream Tech Publishers, 2008. 3. Kathy walrath ”
6. Professional Java Server Programming by Subrahmanyam Allamaraju, Cedric Buest Wiley Publication
7. Core Java, Volume II: Advanced Features by Cay Horstmann and Gary Cornell Pearson Publication
8. Beginning JSP, JSF and Tomcat, Giulio Zambon, Apress

CTMTCS SVI P6 EL1: Computer Graphics

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 03 | 00 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To understand Computer Graphics and its importance.
2. To create graphics with programming.
3. To understand the concept of visualization.
4. To learn and apply various transformation techniques.
5. To understand various animation techniques.

UNIT – I

Introduction

Basics, applications and scope, Graphics standards, Interaction (sample- and event-driven) and Graphics user Interface (GUI) features. **Display Systems:** Raster refresh displays, CRT basics, video basics, Flat panel displays.

UNIT – II

Transformations & Scan Conversions

Transformations - Affine (2-D and 3-D): Rotation, Translation, Scale, Reflection and Shear; **Viewing:** The Camera Transformations - perspective, orthographic, isometric and stereographic views, Viewing pipeline; Camera Models and multi-view generation. Scan conversion and Clipping: Algorithms for drawing Lines, Circles, Ellipse, Polyline. Polygon. Area filling, fill-style; Clipping algorithms: line and polygon, anti-aliasing

UNIT – III

Modelling & OpenGL primitives

Solid Modelling: Wire-frame, Octrees, Sweep, Boundary representations. Regularized Boolean set operations, Constructive Solid Geometry (CSG); Hierarchical Scene and Object graphs, Scene Description. **OpenGL primitives:** Functions, pipeline, sample programs for drawing 2-D, 3-D objects; event handling and view manipulation.

UNIT – IV

Surface Removal, Shading & Illumination

Hidden Surface Removal: Back face detection, Z-buffer method, Painter's algorithm, scan-line algorithm, BSP-trees, Area sub-division method, Ray tracing.

Shading & Illumination: Phong's shading model, Gouraud shading, Shadows and background, Color models, Photo-realistic rendering.

UNIT – V

Advance Topics

Curves and Surfaces: Conics, parametric and non-parametric forms; Bezier (Bernstein Polynomials) Curves, Cubic-Splines, Hermite Curves, B-Splines; Quadratic surfaces, Bezier surfaces and NURBS. Miscellaneous and **Advance topics:** Anti-aliasing methods; Introduction to texture mapping - bump mapping, Displacement mapping, Environmental mapping, relief texture, Procedural noise, image maps, fractals; Animation: types of animation; Soft object modeling; **Visual realism:** Novel view synthesis, Image based rendering, depth of field, Image Morphing; Video based rendering, image stitching/mosaic; GUI design; Image File formats, etc.

Reference Books

1. Computer Graphics; Principles and practice; Second Edition in C; J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes; Addison Wesley, 1997.
2. Computer Graphics - C version; D. Hearn and M. P. Baker; Pearson Education, 2004.
3. Computer Graphics - OpenGL version; D. Hearn and M. P. Baker; Pearson Education.
4. The OpenGL Reference Manual - The Bluebook, Version 1.4, Fourth Edition, Addison-Wesley.
5. The OpenGL Programming Guide - The Redbook, Version 2, Fifth Edition, Addison-Wesley.

CTMTCS SVI P6 EL2: Advance Web Development Technology

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|-------|-------|-------|------------------|-------|------------------------|------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 03 | 00 | 00 | 03 | 03 | 25 | 00:45 | 50 | 01:30 | 100 | 03:00 | - | - | 200 |

Objectives

1. To understand the importance of Java script.
2. To understand various types of Java scripts
3. To create front end web development with JS.
4. To create Graphics with JS
5. To create client server connection.

UNIT – I

Introduction

Introduction to various Java script-based frameworks: Angular.js, Node.js, Express.js, React.js, Vue.js and others, Java script ES6/ES7, Type Script and Java Script.

UNIT – II

Environment Setup - React

React: Setting up development environment, Node.js and npm, Git overview & installation, JSX and developer console, Building Product, Making Product data-driven, Babel and ReactDOM.render(), Components, time-logging app, Getting started with react, previewing the app, prepare the app, Breaking down app into components, How to build the React App from scratch, Updating timers, Deleting timers, Adding timing functionality, add start and stop functionality.

UNIT – III

React Components

Components & Servers: Introduction, Preparation, server.js, The Server API, text/html endpoint, JSON endpoints, Playing with the API, Server and Client access, JSX and the Virtual DOM, React Uses a Virtual DOM, Modify the Actual DOM, What is a Virtual DOM? Virtual DOM Pieces, CONTENTS: ReactElement, Working with ReactElement, Rendering ReactElement, Adding Text (with children), **ReactDOM.render() JSX:** Create Elements, Attribute Expressions, Conditional Child Expressions, Boolean Attributes, Comments, Spread Syntax, Gotchas.

UNIT – IV

Component Configuration & States

Advanced Component Configuration: Introduction to props, state, and children, Components, Props, state, stateless components, Accessing Children components, **Forms:** overview, Inputs, Custom Components, Redux, Form Modules.

UNIT – V

Flux and Redux

Introduction, Intermediate Redux, Use of Presentational and Container Components with redux, **GraphQL:** Introduction, GraphQL vs REST, GraphQL vs SQL, Syntax, complex types, graph nodes, viewers, connections and Edges, GraphQL with JS, GraphQL with React, GraphQL Server, Relay, React native

Reference Books

1. Fullstack React: The Complete Guide to ReactJS and Friends Written by Anthony Accomazzo, Nate Murray, Ari Lerner, Clay Allsopp, David Guttman, and Tyler McGinnis, 2018, newline.
2. The Road to Learn React: Your Journey to Master Plain Yet Pragmatic React. Js by Robin Wieruch
3. React. Js Book: Learning React JavaScript Library from Scratch by Greg Sidelnikov
4. Learning React: Modern Patterns for Developing React Apps by Alex Banks and Eve Porcello
5. React Explained: Your Step-by-Step Guide to React by Zac Gordon

CTBTCSE SVI L1: Compiler Design Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|-----------|------------------------|-------|-----|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | Practical | | | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 | |

Experiments / Practical's to support the associated theory course.

CTBTCSE SVI L2: Advance Java Programming Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 |

Experiments / Practical's to support the associated theory course.

CTBTCSE SVI P6 EL1: Computer Graphics Laboratory

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 |

Experiments / Practical's to support the associated theory course.

CTBTCSE SVI P6 EL2: Advance Web Development **Technology Laboratory**

| Teaching Scheme | | | | | Evaluation Scheme | | | | | | | | |
|-----------------|----|----|----|-----|-------------------|------|-------|------|------------------|------|------------------------|-------|-------|
| Th | Tu | Pr | C | TCH | Theory | | | | | | Practical | | Total |
| | | | | | Internal Exams | | | | University Exams | | University Exams (LPW) | | |
| | | | | | TA-1/TA-2 | | MSE | | Marks | Hrs. | Marks | Hrs. | |
| | | | | | Marks | Hrs. | Marks | Hrs. | | | | | |
| 00 | 00 | 01 | 01 | 02 | -- | -- | -- | -- | -- | -- | 100 | 03:00 | 100 |

Experiments / Practical's to support the associated theory course.