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Credit Definition

Type	Duration (in Hour)	Credit
Lecture (L)	1	1
Tutorial (T)	1	1
Practical (P)	2	1

Total Credit

Year	Semester	hrs./Week	Credit
1st	1st	30	24
	2nd	29	23
2nd	3rd	30	24
	4th	30	25
3rd	5th	26	22
	6th	27	23
4th	7th	22	21
	8th	17	16
Total			**178**

Category Codification with Credit Break up

Definition of Category	Code	No	Credit
Basic Science	BS	1	26
Engineering Science	ES	2	23
Professional Core	PC	3	47
Professional Elective (Discipline Specific)	PE	4	21
Open Elective (General Elective)	OE	5	12
Humanities & Social Science including Management	HSM	6	9
Project Work / Seminar / Internship / Entrepreneurship	PSE	7	22
Mandatory / University Specified (Environmental Sc. / Induction Training / Indian Constitution / Foreign language)	MUS	8	18
Total			**178**

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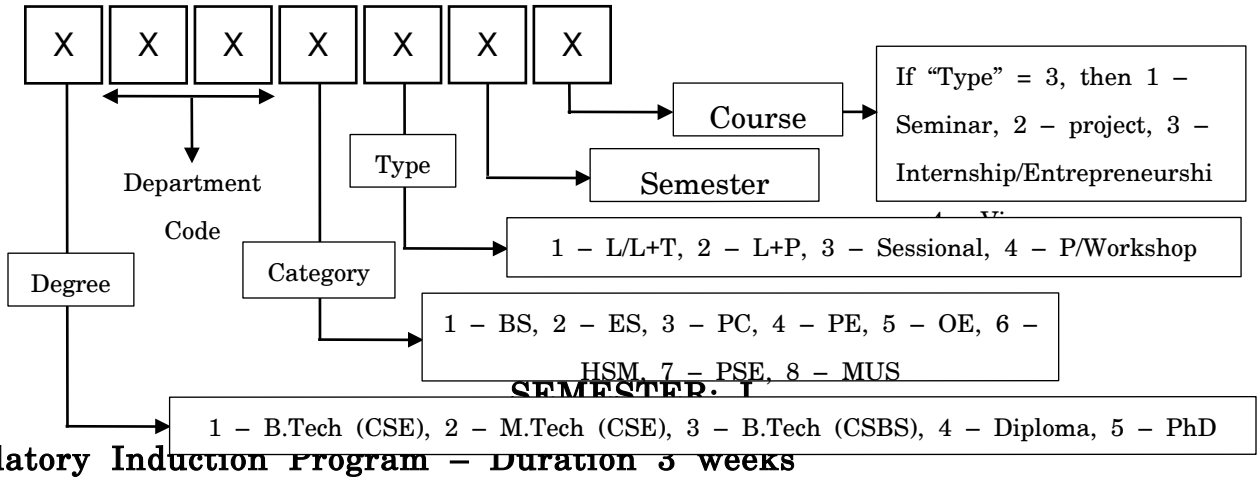
Category wise Credit Distribution

Subject Codification



SEMESTER I

Mandatory Induction Program – Duration 3 weeks

- Physical Activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to Local Areas
- Familiarization to Department/Branch & Innovations

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Sl No	Course Title	Code	Credit	Type		
				L	T	P
1	Engineering Mathematics – I	1191111	4	3	1	0
2	Engineering Physics	1171212	4	3	0	2
3	Engineering Drawing – CAD	1102411	2	0	0	3
4	Fundamentals of Computer Sc. & Problem Solving	1112211	4	3	0	3
5	Business Communication & Value Sc.	1216211	3	2	0	2
6	Principles of Electrical Engineering	1132212	4	3	0	2
7	Foreign Language - I	1278111	2	2	0	0
8	Career Advancement Skill - I	1118212	1	1	0	0
Total Credit (BS: 08, ES: 10, HSM: 03, MUS: 03)			**24**	**30 (hrs./Week)**		

1. Engineering Mathematics - I

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Engineering Mathematics – I	**COURSE CREDIT :** 04 [3-1-0]
DEPARTMENT: Mathematics	**CATEGORY:** SH
CODE: 1191111	**SEMESTER:** First
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Differential Calculus: Fuctions of one variable Rolle's theorem, Mean value theorem, Taylor series expansion,

concavity and convexity of a curve, points of inflexion, asymptotes and curvature, curve tracing.
Function of several variables: Limit, continuity and differentiability of functions of several variables, partial derivatives and their Geometrical interpretation, differential, derivatives of composite and implicit functions, derivatives of higher order and their commutatively, Euler's theorem on homogeneous function, harmonic functions, Taylor's expansion of functions of several variables, Maxima and Minima of functions of several variables- Lagrange's method of multipliers.

Integral Calculus: Review of integration and definite integral. Definite integral as the limit of sum, applications of definite integrals, double and triple integral, area under plane curve, improper integral.

Differential Equations: Order, degree, formation of differential equation, First order differential equation – exact, linear and Bernoulli's form, second order differential equations with constant coefficients, method of variation of parameters, general linear differential equations with constant coefficients, Euler's equations, system of differential equations. Applications.

Sequences and Series: Sequences and their limits, convergence of series, comparison test, Ratio test, Root test, Absolute and conditional convergence, alternating series, Power series.

Text Books:

1. Higher Algebra, S. K. Mapa, Levant Books.
2. Advanced Higher Algebra, Chakravorty and Ghosh, U N Dhar Pvt. Ltd.ISBN 97893806736
3. Integral Calculus including Differential Equations, Das and Mukherjee, U N Dhar Pvt. Ltd.ISBN: 978-9380673882
4. Differential Calculus, Das and Mukherjee, U N Dhar Pvt. Ltd. ISBN:9789380673448.

Reference Books:

5. Advanced Engineering Mathematics, E Kreyszig, Wiley
6. Ghosh and Maity, An Introduction to Analysis: Differential Calculus, New Central Book Agency, 2011, ISBN: 9788173812026
7. G.F. Simmons, Differential Equations with applications and Historical Notes, CRC Press ISBN: 978-1-4987-0259-1
8. M.D. Raisinghania, Ordinary and Partial Differential Equation, S. Chand and Company, 2006 ISBN 81-219-0892-2
9. Schaum's Outline of Differential Equations, 4th Edition (Schaum's Outlines) by Richard Bronson and Gabriel Costa.

2. Engineering Physics

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COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Engineering Physics	**COURSE CREDIT :** 04 [3-0-2]
DEPARTMENT: Physics	**CATEGORY:** SH
CODE: 1171212	**SEMESTER:** First
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Oscillation and fundamental of wave optics: Periodic motion-simple harmonic motion-characteristics of simple harmonic motion-vibration of simple springs mass system. Resonance-definition., damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators.

Interference-principle of superposition-young's experiment: Theory of interference fringes-types of Interference-Fresnel's Prism-Newton's rings, Diffraction-Two kinds of Diffraction-Difference between interference and Diffraction-Fresnel's half period zone and zone plate-Fraunhofer diffraction at single slit-plane diffraction grating. Temporal and Spatial Coherence.

Basic Idea of Electromagnetisms, Maxwell's Equations: Polarization - Concept of production of polarized beam of light from two SHM acting at right angle; plane, elliptical and circularly polarized light, Brewster's law, double refraction.

Quantum Mechanics and Crystallography: Introduction - Planck's quantum theory- Matter waves, de-Broglie wavelength, Heisenberg's Uncertainty principle, time independent and time dependent Schrödinger's wave equation, Physical significance of wave function, Particle in a one dimensional potential box, Heisenberg Picture. Crystallography - Basic terms-types of crystal systems, Bravais lattices, miller indices, d spacing, Debye Scherrer powder method, laue method- Atomic packing factor for SC, BCC, FCC and HCP structures. Semiconductor Physics - conductor, semiconductor and Insulator; Basic concept of Band theory.

Laser and Fiber optics: Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: Ruby Laser, CO2 and Neodymium lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in engineering. Fiber optics and Applications, Types of optical fibers.

Thermodynamics: Zeroth law of thermodynamics, first law of thermodynamics, brief discussion on application of 1st law, second law of thermodynamics and concept of Engine, entropy, change in entropy in reversible and irreversible processes, third law of thermodynamics.

Laboratory

1) Magnetic field along the axis of current carrying coil – Stewart and Gee
2) Determination of Hall coefficient of semi-conductor

3) Determination of Plank constant
4) Determination of wave length of light by Laser diffraction method
5) Determination of wave length of light by Newton's Ring method
6) Determination of laser and optical fiber parameters
7) Determination of Stefan's Constant.

Text Books:
1. Beiser A, "Concepts of Modern Physics", Fifth Edition, McGraw Hill International.
2. David Halliday, Robert Resnick, Jearl Walker, "Fundamentals of Physics", Wileyplus.

Reference Books:
1. Ajoy Ghatak, "Optics" Fifth Edition, Tata McGraw Hill.
2. Sears &Zemansky, "University Physics", Addison-Wesley.
3. Jenkins and White, "Fundamentals of Optics", Third Edition, McGraw-Hill.

3. Engineering Drawing - CAD

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Engineering Drawing	**COURSE CREDIT :** 02 [0-0-3]
DEPARTMENT: Mechanical Engineering	**CATEGORY:** SH
CODE: 1102411	**SEMESTER:** First
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Introduction to Technical Drawing Standard: Technical Drawing, ISO Standard, Paper Size, Lay out, Line, Scale, Title Block, Application of lines, drawing folding, view, projection, auxiliary view.

Section and Dimension: Section and hatch, type of hatch. Coordinate and dimension, Chain dimension, Parallel dimension, Combined dimension, Coordinates dimension, Chord, Arc, Angle, Chamfer, Countersink, Dimension of Cylinder part, cubical part, sheet metal part.

Tolerance: Classification of tolerance, Linear tolerance, Angular Tolerance, Special tolerance. • Tolerance indication. Bilateral and Unilateral tolerance, tolerance and fit, geometrical tolerance.

Parts, Welding and Assembly: Introduction standard parts, part drawing. Introduction to welding, welding symbols and indication to drawing, assembly drawing.

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Text Books:
1. "Technical Drawing", Authors: Giesecke, Mitchell, Spencer, Hill, Dygdon, Novak, Publisher: Pearson, Prentice Hall, ISBN:0-13-178446-3
2. "Technical Drawing", Publisher: ISO Standard Handbook, ISBN: 178446 – 3

4. Fundamentals of Computer Science & Problem Solving

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Fundamentals of Computer Science & Problem Solving	**COURSE CREDIT :** 04 [3-0-3]
DEPARTMENT: Computer Sc. & Engg.	**CATEGORY:** ES
CODE: 1112211	**SEMESTER:** First
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

General problem Solving concepts: Algorithm, and Flowchart for problem solving with sequential Logic Structure, Decisions and Loops.

Imperative languages: Introduction to imperative language; syntax and constructs of a specific language (ANSI C):

Types Operator and Expressions with discussion of variable naming and Hungarian Notation: Variable Names, Data Type and Sizes (Little Endian Big Endian), Constants, Declarations, Arithmetic Operators, Relational Operators, Logical Operators, Type Conversion, Increment Decrement Operators, Bitwise Operators, Assignment Operators and Expressions, Precedence and Order of Evaluation, proper variable naming and Hungarian Notation

Control Flow with discussion on structured and unstructured programming: Statements and Blocks, If-Else-If, Switch, Loops – while, do, for, break and continue, Goto Labels, structured and un-structured programming

Functions and Program Structure with discussion on standard library: Basics of functions, parameter passing and returning type, C main return as integer, External, Auto, Local, Static, Register Variables, Scope Rules, Block structure, Initialization, Recursion, Preprocessor, Standard Library Functions and return types

Pointers and Arrays: Pointers and address, Pointers and Function Arguments, Pointers and Arrays, Address Arithmetic, character Pointers and Functions, Pointer Arrays, Pointer to Pointer, Multi-dimensional array and

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Row/column major formats, Initialization of Pointer Arrays, Command line arguments, Pointer to functions, complicated declarations and how they are evaluated.

Structures: Basic Structures, Structures and Functions, Array of structures, Pointer of structures, Self-referral Structures, Table look up, Typedef, Unions, Bit-fields

Input and Output: Standard I/O, Formatted Output – printf, Formated Input – scanf, Variable length argument list, file access including FILE structure, fopen, stdin, sdtout and stderr, Error Handling including exit, perror and error.h, Line I/O, related miscellaneous functions

Unix system Interface: File Descriptor, Low level I/O – read and write, Open, create, close and unlink, Random access – lseek, Discussions on Listing Directory, Storage allocator

Programming Method: Debugging, Macro, User Defined Header, User Defined Library Function, makefile utility.

Laboratory:

1. Algorithm and flowcharts of small problems like GCD
2. Structured code writing with:
    i. Small but tricky codes
    ii. Proper parameter passing
    iii. Command line Arguments
    iv. Variable parameter
    v. Pointer to functions
    vi. User defined header
    vii. Make file utility
    viii. Multi file program and user defined libraries
    ix. Interesting substring matching / searching programs
    x. Parsing related assignments

Text Books:

1. B. W. Kernighan and D. M. Ritchi, “The C Programming Language”, Second Edition, PHI.
2. B. Gottfried, “Programming in C”, Second Edition, Schaum Outline Series.

Reference Books:

1. Herbert Schildt, “C: The Complete Reference”, Fourth Edition, McGraw Hill.
2. Yashavant Kanetkar, “Let Us C”, BPB Publications.

5. Business Communication & Value Science

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COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Business Comm. & Value Science	**COURSE CREDIT :** 03 [2-0-2]
DEPARTMENT: English	**CATEGORY:** SH
CODE: 1216211	**SEMESTER:** First
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Overview of the course with immersion activity, Overview of biz communication, Self-awareness, confidence and communication, Essentials of Business communication, Application of communication skills, Application of Life Skills, Assignment.

Reference Books:
1. English vocabulary in use – Alan Mc'carthy and O'dell
2. APAART: Speak Well 1 (English language and communication)
3. APAART: Speak Well 2 (Soft Skills)
4. Business Communication – Dr. Saroj Hiremath

6. Principles of Electrical Engineering

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Principles of Electrical Engineering	**COURSE CREDIT :** 04 [3-0-2]
DEPARTMENT: Electrical Engineering	**CATEGORY:** SH
CODE: 1132212	**SEMESTER:** First
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Introduction and overviews: Electron Devices, Circuits and Systems, Integrated Circuits, Analog and digital signals

Basic Concepts and Circuit Analysis: Concept of Potential difference, voltage, current, Fundamental linear passive and active elements to their functional current-voltage relation, Terminology and symbols in order to describe electric networks, Concept of work, power, energy and conversion of energy. DC Circuits-Current-voltage relations of electric network by mathematical equations to analyse the network (Thevenin's theorem,

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Norton's Theorem, Maximum Power Transfer theorem) voltage source and current sources, ideal and practical, Kirchhoff's laws and applications to network solutions using mesh analysis, Simplifications of networks using series- parallel, Star/Delta transformation. Superposition theorem. AC Circuits-AC waveform definitions, form factor, peak factor, study of R-L, R-C, RLC series circuit, R-L-C parallel circuit, phasor representation in polar and rectangular form, concept of impedance, admittance, active, reactive, apparent and complex power, power factor, 3 phase Balanced AC Circuits.

Principle of Electro-mechanics and Electrostatics: Electrostatic field, electric field intensity, electric field strength, absolute permittivity, relative permittivity, capacitor composite, dielectric capacitors, capacitors in series& parallel, energy stored in capacitors, charging and discharging of
capacitors, Principle of batteries, types, construction and application.

Electro-mechanics: Electricity and Magnetism, magnetic field and faraday's law, self and mutual inductance, Ampere's law, Magnetic circuit, Magnetic material and B-H Curve, Single phase transformer, principle of operation, EMF equation, voltage ratio, current ratio, KVA rating, efficiency and regulation, Electromechanical energy conversion, Basic concept of indicating and integrating instruments.

Measurements and Sensors: Introduction to measuring devices/sensors and transducers related to electrical signals, Elementary methods for the measurement of electrical quantities in DC and AC systems and their practical application.

Electrical Wiring and Illumination system: Basic layout of distribution system, Types of Wiring System &Wiring Accessories, Necessity of earthing, Types of earthing, Different types of lamps (Incandescent, Fluorescent, Sodium Vapour, Mercury Vapour, Metal Halide, CFL, LED)

Laboratory

1. Familiarization of electrical Elements, sources, measuring devices and transducers related to electrical circuits
2. Determination of resistance temperature coefficient
3. Verification of Network Theorem (Superposition, Thevenin, Norton, Maximum Power Transfer theorem)
4. Simulation of R-L-C series circuits for XL> XC , XL< XC & XL= XC
5. Simulation of Time response of RC circuit
6. Verification of relation in between voltage and current in three phase balanced star and delta connected loads.
7. Demonstration of measurement of electrical quantities in DC and AC systems.

Text Books:

1. A. E. Fitzgerald, Kingsely Jr Charles, D. Umans Stephen, "Electric Machinery", Sixth Edition Tata McGraw Hill.
2. B. L.Theraja, "A Textbook of Electrical Technology", vol. I, S. Chand and Company Ltd., New Delhi.
3. V. K. Mehta, "Basic Electrical Engineering", S. Chand and Company Ltd., New Delhi.
4. J. Nagrath and Kothari, "Theory and problems of Basic Electrical Engineering", Second

Edition Prentice Hall of India Pvt. Ltd.

Reference Books:

1. Edward Hughes, “Electrical Technology”, Tenth Edition, Pearson Education Publication.
2. Vincent. Del. Toro, “Electrical Engineering Fundamentals”, Second Edition, Prentice Hall India.
3. Sudhakar Shyammohan, “Circuits and Networks: Analysis and Synthesis”, Fifth Edition Tata McGraw Hill Education.

7. Foreign Language

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Foreign Language (German/Spanish/Japanese)	**COURSE CREDIT :** 02 [2-0-0]
DEPARTMENT: Foreign Language	**CATEGORY:** MUS
CODE: 1278111	**SEMESTER:** First
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

References:

8. Career Advancement Skill- I

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Career Advancement Skill-I	**COURSE CREDIT :** 01 [1-0-0]
DEPARTMENT: Humanities	**CATEGORY:** HU
CODE: 1118212	**SEMESTER:** First
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

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SEMESTER: II

Sl No	Course Title	Code	Credit	Type		
				L	T	P
1	Engineering Mathematics – II	1191121	4	3	1	0
2	Engineering Chemistry	1161222	4	3	0	2
3	Introduction to Manufacturing Processes	1102421	2	0	0	3
4	Computer Programming Practices - I	1112222	4	3	0	3
5	Principles of Electronics Engineering	1122221	4	3	0	2
6	Environmental Science	1158121	2	2	0	0
7	Foreign Language - II	1278122	2	2	0	0
8	Career Advancement Skill - II	1118223	1	0	0	2
Total Credit (BS: 08, ES: 10, MUS: 05)			23	29 (hrs./Week)		

1. Engineering Mathematics - II

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Engineering Mathematics – II	**COURSE CREDIT :** 04 [3-1-0]
DEPARTMENT: Mathematics	**CATEGORY:** SH
CODE: 1191121	**SEMESTER:** Second
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Algebraic Structures: Sets, algebra of sets and their applications, Relations, Mapping, Groups, Abelian groups, Subgroups, Cyclic groups, Permutation group, Definition of Ring, Field and simple related problems.

Graph Theory: Graphs, Digraphs, Weighted graph, Connected and disconnected graphs, Complement of a graph, Regular graph, Complete graph, Sub graph, Walks, Paths, Circuits, Euler Graph, Cut sets and cut vertices, Matrix representation of a graph, Adjacency and incidence matrices of a graph, Graph isomorphism, Bipartite graph. Eulers formula (n - e + r = 2) for connected planar graph and its generalisation for graphs with connected components. Detection of planarity. Graph colouring. Chromatic numbers of Cn, Kn, Km,n and other simple graphs. Simple applications of chromatic numbers.

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Tree: Definition and properties, Binary tree, Spanning tree of a graph, Minimum spanning tree, properties of trees, Algorithms: Dijkstra's Algorithm for shortest path problem, Determination of minimal spanning tree using Kruskal's and Prim's algorithms.

Propositional Calculus: Proposition, propositional variables, combination of propositions ,Conjunction, Disjunction, Negation and their truth table, derived connectors. Conditional Connectives, Implication, Converse, Contrapositive, Inverse, Bi conditional statements with truth table, Logical Equivalence, Tautology, Normal forms-CNF, DNF; Predicates and Logical Quantifications of propositions and related examples.
Counting Techniques: Permutations, Combinations, Binomial coefficients, Pigeon-hole Principle, Principles of inclusion and exclusions; Generating functions, Recurrence Relations and their solutions using generating function, Recurrence relation of Fibonacci numbers and it's solution, Divide-and-Conquer algorithm and its recurrence relation and its simple application in computer.

Boolean Algebra and Combinatorial Circuits: Definition, Sub-Algebra, Isomorphic Boolean Algebra, Boolean functions and expressions, DNF and CNF, principle of duality, design of digital circuits, Applications of Boolean algebra in switching theory, series and parallel connections, Karnaugh Maps, minimization of Boolean expression using k-map.

Text Books:

1. Higher Algebra, S. K. Mapa, Levant Books.
2. N. Deo, Graph Theory with applications to Engineering and Computer Science
   Prentice Hall Of India, 2007, ISBN: 978-81-203-0145-0
3. S. Pal and S.C. Bhunia, Engineering Mathematics, Oxford University Press, 2015, ISBN 978-0-19-807089-4
4. S. K. Sarkar, A text book of Discrete Mathematics, S. Chand & Company Ltd., 2006. ISBN : 81-219-2232-1

Reference Books:

5. S. B. Gupta, Discrete Mathematics and Structures , Laxmi Publications(P) Ltd., 2007 ISBN: 81-7008-918-2
6. D. S. Malik and M.K. Sen, Discrete Mathematics Theory and Applications (Revised Addition), Cengage Learning, 2017, ISBN: 978-81-315-1866-3
7. Advanced Engineering Mathematics - Erwin Kreyszig is published by Wiley India
8. D. Poole, Linear Algebra –A Modern Introduction, CENGAGE Learning, 2015 ISBN: 978-81-315-30245

2. Engineering Chemistry

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COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Engineering Chemistry	**COURSE CREDIT :** 04 [3-0-2]
DEPARTMENT: Chemistry	**CATEGORY:** BS
CODE: 1161222	**SEMESTER:** Second
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Thermodynamics of Chemical Processes: Concept of entropy, Chemical potential, Equilibrium conditions for closed systems, Phase and reaction equilibria, Maxwell relations, Real gas and real solution.

Electrochemical Systems: Electrochemical cells and EMF, Applications of EMF measurements: Thermodynamic data, activity coefficients, solubility product and pH, corrosion.

Kinetics of Chemical Reactions: Reversible, consecutive and parallel reactions, Steady state approximation, Chain reactions, Photochemical kinetics.

Bonding Models in Inorganic Chemistry: Molecular orbital theory, Valence-bond theory, Crystal field theory.

Fundamentals of Microwave, IR and UV-VIS Spectroscopy: Basic concepts of spectroscopy, Selection rule, Determination of molecular structure.

Coordination Chemistry: Coordination numbers, Chelate effect, Coordination complexes and application, Bio-inorganic chemistry: Metal ions in Biological systems, environmental aspects of Metals, NOx, CO, CO2.

Organic Reaction Mechanism: Mechanisms of selected organic, bio-organic, polymerization and catalytic reactions. Stereochemistry of Carbon Compounds: Selected Organic Compounds: Natural products and Biomolecules (Amino acids/nucleic acids/proteins).

Laboratory Component: Surface tension and parachor, Measurement of the coefficient of viscosity: CMC of a surfactant, Conductometric titration, pH-metric/potentiometric titration, Solubility product, Kinetics of ester hydrolysis, Estimation of Fe2+, EDTA titration, Estimation of base content and acid content of commercially available antacid and vitamin C respectively, Synthesis of Mohr's salt, Synthesis of aspirin, Demonstration of a few important physico-chemical processes. (e.g. Gel electrophoresis, Oscillatory reactions)

Text Books:

1. Engineering Chemistry, Satyaprakash, Khanna Book Publishing, Delhi
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell

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Reference Books:
1. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, M. S. Krishnan
2. Physical Chemistry, P. C. Rakshit, Sarat Book House

3. Introduction to Manufacturing Processes

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Workshop / Manufacturing Practices	**COURSE CREDIT :** 02 [0-0-3]
DEPARTMENT: Physics	**CATEGORY:** ES
CODE: 1102421	**SEMESTER:** Second
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Theory Component: Basic concepts and principles of manufacturing, Performing Processes: Casting, forging, rolling, drawing, extrusion, press tool work, plastic moulding and powder metallurgy, Joining Processes: Welding, brazing and crimping, Semi-finishing and finishing processes: Machining (Turning, shaping, drilling, Milling and grinding), Non-traditional Processes: Abrasive jet machining, Ultrasonic machining, Electro-discharge machining, Electrochemical machining and laser beam machining, Product Quality: Possible defects and their detection, assessment and remedy.

Laboratory Component: Suggested Assignments: Introducing to various machine tools and demonstration on machining, Making a steel pin as per drawing by machining in centre lathe, External screw thread by single point chasing in lathe, Making a cast iron Vee block by shaping, Making a regular polygon prism (MS) by milling, Making a gauge as per drawing, Study of machining in machining in machining centre (CNC) and Electro discharge machining (EDM), Orientation, demonstration and practice on metal casting, Practicing sand moulding using split and uneven parting line pattern, Practice on CO2 moulding and machine moulding, Mechanised sand preparation and melting practice, Practice on Oxy-acetylene gas welding and manual metal arc welding (running bead), Practice on oxy-acetylene gas cutting and arc welding for butt welding, Introduction and demonstration on submerged arc welding and plasma spray coating, Demonstration of deep drawing process.

Reference Books:

1. Elements of Workshop Technology, Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K, Media promoters and publishers, Mumbai.
2. Manufacturing Engineering and Technology, Kalpakjian S. and Steven S. PEI India Edition.
3. Manufacturing Technology, G. P. Hariharan and A. Suresh, Pearson Education, 2008.

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4. Processes and Materials of Manufacture, Roy A. Lindberg, Prentice Hall India, 1998.
5. Manufacturing Technology, Rao P.N, TMG

4. Computer Programming Practices- I

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Computer Programming Practices - I	**COURSE CREDIT :** 04 [3-0-3]
DEPARTMENT: Computer Sc. & Engg.	**CATEGORY:** CS
CODE: 1112222	**SEMESTER:** Second
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Functions and Program Structure with discussion on standard library: Basics of functions, parameter passing and returning type, C main return as integer, External, Auto, Local, Static, Register Variables, Scope Rules, Block structure, Initialization, Recursion, Preprocessor, Standard Library Functions and return types

Pointers and Arrays: Pointers and address, Pointers and Function Arguments, Pointers and Arrays, Address Arithmetic, character Pointers and functions, Pointer Arrays, Pointer to Pointer, Multi-dimensional array and Row/column major formats, Initialization of Pointer Arrays, Command line arguments, Pointer to functions, complicated declarations and how they are evaluated.

Storage Class: Different type of Storage Classes, automatic, register, static and external. Local variable and global variable, scope and rules. Static and automatic storage in global variable. Accessing through several functions. Simple program using recursions.

Structures and Unions: Basic Structures, Structures and Functions, Array of structures, Pointer of structures, Self-referral Structures, Table look up, Typedef, Unions, Bit-fields.

Dynamic Memory allocation: Memory allocation functions such as malloc(), calloc(), free(), realloc(). Define linked list in terms of dynamic memory allocation, different operations such as insert, delete, and traversal. Implementation of circular linked list.

File handling: File Descriptor, Low level I/O – read and write, Open, create, close and unlink, Random access – seek, Discussions on Listing Directory, Storage allocator.

Laboratory:

1. Algorithm for complex problem

2. Structured code writing with:
   i. Array on different dimension
   ii. Pointer handling
   iii. Pointer vs array
   iv. Pointer to functions
   v. Define structure
   vi. User defined header
   vii. Make file utility
   viii. Multi file program and user defined libraries
   ix. Linked list
   x. Recursion

Text Books:
1. B. W. Kernighan and D. M. Ritchi, "The C Programming Language", Second Edition, PHI.
2. B. Gottfried, "Programming in C", Second Edition, Schaum Outline Series.

Reference Books:
1. Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGraw Hill.
2. Reema Theraja, "Programming in C", Oxford University press.

5. Principles of Electronics Engineering

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Principles of Electronics Engineering	**COURSE CREDIT :** 04 [3-0-2]
DEPARTMENT: Electronics & Communication Engg.	**CATEGORY:** ES
CODE: 1122221	**SEMESTER:** Second
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Introduction to Electronic devices: Passive devices, diode, bipolar junction transistor (BJT), metal oxide semiconductor field-effect transistor (MOSFET)

Diode and its application: Basic structure and operating principle, current-voltage characteristic, large and small-signal models, iterative and graphical analysis, rectifier circuits (half-wave and full-wave rectifiers, rectifiers with capacitor filter), voltage regulator (using Zener diode), clipper (limiter) circuits, clamper circuits

Bipolar Junction Transistors and their Applications: Structure and modes of operation; n-p-n and p-n-p transistor in active mode, DC analysis of both transistor circuits; BJT as an amplifier, small-signal equivalent circuits, single-stage BJT amplifier (common-emitter mode); BJT as a switch

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Metal Oxide Semiconductor Field-Effect Transistors and their Applications: Structure and physical operation of n-type and p-type MOSFET; DC analysis of MOSFET circuits; MOSFET as an amplifier, small-signal equivalent circuits, single-stage MOSFET amplifier (common-source mode); MOSFET as a switch

Operational Amplifier (Op Amp): Ideal op amp; inverting amplifier, amplifier with a T-network, effect of finite gain, summing amplifier; non-inverting configuration, voltage follower; op amp applications like current-to-voltage converter, voltage-to-current converter, difference amplifier, instrumentation amplifier, integrator and differentiator

Feedback: Basic concepts of negative feedback; four ideal feedback topologies; Oscillators: basic principles of sinusoidal oscillation; Example circuits.

Digital Electronics: Boolean algebra and rules of simplification; combinational circuits like adder, decoder, encoder, multiplexer and de-multiplexer; sequential circuits like flip-flops, counters and shift registers.

Laboratory Component: Familiarization with electronic components and usage of multimeter, Familiarization with oscilloscope, signal generator and further usage of multimeters, Frequency-response and square-wave testing of R-C, C-R and R-L networks, Studies on Voltage Rectifiers, Studies on Common-Emitter amplifiers, Studies on analog circuits using OP-AMP, Studies on logic gates.

Text Book:

1. Integrated Electronics, Millman & Halkias –McGraw Hill.
3. Electronic Circuit: Discrete & Integrated, 3/e, Schilling & Belove—McGraw Hill
4. Fundamentals of Microelectronics, Razavi- - Wiley

Reference Books:

5. Electronic Principles, 6/e, Malvino—McGraw Hill
6. The Art of Electronics, Horowitz & Hill, Cambridge University Press.

6. Environmental Science

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Environmental Science	**COURSE CREDIT :** 02 [2-0-0]
DEPARTMENT: Chemistry	**CATEGORY:** MUS
CODE: 1158121	**SEMESTER:** Second
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

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Introduction: Definition, principles and scope of Environmental Science, Earth, Man and Environment. Ecosystems, Pathways in Ecosystems. Physico-chemical and Biological factors in the Environment, Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere. Mass and Energy transfer across the various interfaces, material balance. Atmospheric stability, Natural resources, conservation and sustainable development.

Fundamentals of Environmental Chemistry: Stochiometry, Gibbs' energy, Chemical potential, Chemical equilibria, acid base reactions, solubility product, solubility of gases in water, the carbonate system, unsaturated and saturated hydrocarbons, radionuclides.

Chemical composition of Air: Classification of elements, chemical speciation. Particles, ions and radicals in the atmosphere. Chemical processes for formation of inorganic and organic particulate matter. Thermochemical and photochemical reactions in the atmosphere. Oxygen and ozone chemistry. Chemistry of air pollutants, Photochemical smog.

Ecosystem: Structure and functions, Abiotic and Biotic components, energy flows, Food Chains, Food web, Ecological pyramids, types and diversity. Ecological Succession, Population, Community ecology and Parasitism, Preypredator relationships.

Mineral Resources and Environment: Resources and Reserves, Minerals and Population. Oceans as new areas for exploration of mineral resources. Ocean ore and recycling of resources. Environmental impact of exploitation, processing and smelting of minerals.

Water Resources and Environment: Global Water Balance. Ice Sheets and fluctuations of sea levels. Origin and composition of seawater. Hydrological cycle. Factors influencing the surface water. Types of water. Resources of oceans. Ocean pollution by toxic wastes. Human use of surface and groundwater. Groundwater pollution.

Text Book:

1. Environmental Science, Miller T.G. Jr., Wadsworth Publishing Co.
2. Environmental Biology, Agarwal, K.C. 2001, Nidi Publ. Ltd.

Reference Books:

3. The Biodiversity of India, Bharucha Erach, Mapin Publishing Pvt. Ltd.
4. Environmental Chemistry, De A.K, Wiley Eastern Ltd.
5. Environmental Science systems & Solutions, Mckinney, M.L. & School, R.M. 1996

7. Foreign Language

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P

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NAME: Foreign Language (German/Spanish/Japanese)	**COURSE CREDIT :** 02 [2-0-0]
DEPARTMENT: Foreign Language	**CATEGORY:** MUS
CODE: 1278122	**SEMESTER:** Second
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

References:

8. Career Advancement Skill -II

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Career Advancement Skill- II	**COURSE CREDIT :** 01 [0-0-2]
DEPARTMENT: Humanities	**CATEGORY:** MUS
CODE: 1118223	**SEMESTER:** Second
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

References:

SEMESTER: III

Sl No	Course Title	Code	Credit	Type		
				L	T	P
1	Data Structure & Algorithm	1113231	4	3	0	3
2	Computer Organization and Architecture	1113232	4	3	0	3
3	Principle of Object Oriented Programming	1113233	4	3	0	3
4	Biology for Engineers	1151131	2	2	0	0
5	Switching Circuits & Logic Design	1122131	3	3	0	0
6	Engineering Mathematics – III	1191131	4	3	1	0
7	Career Advancement Skill - III	1118231	2	1	0	2
8	Mentored Seminar – I	1117331	1			
Total Credit (BS: 06, ES: 03, PC: 12, PSE: 01, MUS: 02)			24	30 (hrs./Week)		

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1. Data Structure & Algorithm

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Data Structure & Algorithm	**COURSE CREDIT :** 04 [3-0-3]
DEPARTMENT: Computer Sc. & Engg.	**CATEGORY:** CS
CODE: 1113231	**SEMESTER:** Third
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Basic Terminologies & Introduction to Algorithm and Data Organization: Algorithm specification, Recursion, Performance analysis, Asymptotic Notation - The Big-O, Omega and Theta notation, Programming Style, Refinement of Coding - Time-Space Trade Off, Testing, Data Abstraction.

Linear Data Structure: Array, Stack, Queue, Linked-list and its types, Various Representations, Operations & Applications of Linear Data Structures.

Non-linear Data Structure: Trees (Binary Tree, Threaded Binary Tree, Binary Search Tree, B & B+ Tree, AVL Tree, Splay Tree) and Graphs (Directed, Undirected), Various Representations, Operations (search and traversal algorithms and complexity analysis) & Applications of Non-Linear Data Structures.

Searching and Sorting on Various Data Structures: Sequential Search, Binary Search, Breadth First Search, Depth First Search, Insertion Sort, Selection Sort, Shell Sort, Divide and Conquer Sort, Merge Sort, Quick Sort, Heap Sort, Introduction to Hashing.

File: Organization (Sequential, Direct, Indexed Sequential, Hashed) and various types of accessing schemes.

Laboratory
1. Towers of Hanoi using user defined stacks.
2. Reading, writing, and addition of polynomials.
3. Line editors with line count, word count showing on the screen.
4. Trees with all operations.
5. All graph algorithms.
6. Saving / retrieving non-linear data structure in/from a file

Text Books:
1. Fundamentals of Data Structures, E. Horowitz and S. Sahni, 1977.

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2. Data Structures and Algorithms, Alfred V. Aho, John E. Hopperoft, Jeffrey D. UIlman.

Reference Books:

1. The Art of Computer Programming: Volume 1: Fundamental Algorithms, Donald E. Knuth
2. Introduction to Algorithms, Thomas, H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.
3. Open Data Structures: An Introduction (Open Paths to Enriched Learning), 31st ed. Edition,
Pat Morin

2. Computer Organization and Architecture

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Computer Organization and Architecture	**COURSE CREDIT :** 04 [3-0-3]
DEPARTMENT: Computer Sc & Engg.	**CATEGORY:** CS
CODE: 1113232	**SEMESTER:** Third
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Basic functional blocks of a computer: CPU, 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.

Data representation: Signed number representation, fixed and floating point representations, character representation. Computer arithmetic - integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication - shift-and-add, Booth multiplier, carry save multiplier, etc. Division - restoring and non-restoring techniques, floating point arithmetic.

CPU control unit design: hardwired and micro-programmed design approaches, Case study - design of a simple hypothetical CPU.

Memory system design: semiconductor memory technologies, memory organization.

Peripheral devices and their characteristics: Input-output subsystems, I/O transfers - program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes - role of interrupts in process state transitions.

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards.

Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

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Laboratory Component: Familiarization with assembly language programming, Synthesis / design of simple data paths and controllers, processor design, interfacing with CPU, DAC, ADC, keyboard-display modules, etc, Development kits as well as Microprocessors/PCs may be used for the laboratory, along with design/ simulation tools as and when necessary.

Text Books:

1. Computer Organization and Design: The Hardware/Software Interface, David A. Patterson and John L. Hennessy, Elsevier.
2. Computer Organization, Carl Hamachar, Zvonco Vranesic and Safwat Zaky, McGraw Hill.
3. Computer Architecture and Organization, John P. Hayes, McGraw Hill.

Reference Books:

4. Computer Organization and Architecture: Designing for Performance, William Stallings, Pearson Education.
5. Computer Systems Design and Architecture, Vincent P. Heuring and Harry F. Jordan, Pearson Education.

3. Principle of Object Oriented Programming

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Principle of Object Oriented Programming	**COURSE CREDIT :** 04 [3-0-3]
DEPARTMENT: Computer Sc & Engg.	**CATEGORY:** CS
CODE: 1113233	**SEMESTER:** Third
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Concepts of OOP : Introduction OOP, Procedural Vs. Object Oriented Programming, Principles of OOP, Benefits and applications of OOP.

C++ Basics: Overview, Program structure, namespace, identifiers, variables, constants, enum, operators, typecasting, control structures.

C++ Functions: Simple functions, Call and Return by reference, Inline functions, Macro vs. Inline functions, Overloading of functions, default arguments, friend functions, virtual functions.

Objects and Classes: Basics of object and class in C++, Private and public members, static data and function members, constructors and their types, destructors, operator overloading, type conversion.

Inheritance: Concept of Inheritance, types of inheritance: single, multiple, multilevel, hierarchical, hybrid, protected members, overriding, virtual base class.

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Polymorphism: Pointers in C++, Pointes and Objects, this pointer, virtual and pure virtual functions, Implementing polymorphism.

I/O and File Management: Concept of streams, cin and cout objects, C++ stream classes, Unformatted and formatted I/O, manipulators, File stream, C++ File stream classes, File management functions, File modes, Binary and random Files.

Templates, Exceptions and STL: What is template? Function templates and class templates, Introduction to exception, try-catch-throw, multiple catch, catch all, rethrowing exception, implementing user defined exceptions, Overview and use of Standard Template Library.

Text Book:
1. Object Oriented Programming With C++, E Balagurusamy, TMH
2. C++ Programming, Black Book, Steven Holzner, dreamtech
3. Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia

Reference Books:
1. Object Oriented Programming with ANSI and Turbo C++, Ashok Kamthane, Pearson
2. The Compete Reference C++, Herbert Schlitz, TMH
3. C++ and Object Oriented Programming Paradigm, PHI
4. C++ : How to Program, 9th Edition, Deitel and Deitel, PHI
5. Object Oriented Programming with C++, Saurav Sahay, Oxford.

4. Biology for Engineers

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Biology for Engineers	**COURSE CREDIT :** 02 [2-0-0]
DEPARTMENT: Biological Science	**CATEGORY:** BS
CODE: 1151131	**SEMESTER:** Third
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Introduction: The underlying criterion, such as morphological, biochemical or ecological be highlighted. Hierarchy of life forms at phenomenological level. Classification: (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitata- acquatic or terrestrial (e)

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Molecular taxonomy- three major kingdoms of life. A given organism can come under different category based on classification.

Genetics Purpose: Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis be taught as a part of genetics. Emphasis to be give not to the mechanics of cell. Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes. Discuss about the single gene disorders in human and human genetics genetics.

Biomolecules Purpose: Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids. AICTE Model Curriculum for Undergraduate degree in Civil Engineering (Engineering & Technology).
Enzymes Purpose: Enzyme classification. Mechanism of enzyme action. Discuss at least two examples. Enzyme kinetics and kinetic parameters. Why should we know these parameters to understand biology? RNA catalysis.

Information Transfer Purpose: The molecular basis of coding and decoding genetic information is universal Molecular basis of information transfer. DNA as a genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Concept of genetic code. Universality and degeneracy of genetic code. Define gene in terms of complementation and recombination.

Macromolecular analysis Purpose: How to analyses biological processes at the reductionistic level Proteins-structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.
Metabolism Purpose: The fundamental principles of energy transactions are the same in physical and biological world. Thermodynamics as applied to biological systems. Exothermic and endothermic versus endergonic and exergoinc reactions.

Microbiology Concept: Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms.

Text Books:

1. Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
2. Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons.
3. Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company.

Reference Books:

4. Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
5. Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers.

5. Switching Circuit & Logic Design

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COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Switching Circuit and Logic Design	**COURSE CREDIT :** 03 [3-0-0]
DEPARTMENT: Electronics & Communication Engg.	**CATEGORY:** ES
CODE: 1122131	**SEMESTER:** Third
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Introduction: Logic design, transistors as switches, CMOS gates, sequential circuits, some examples.

Digital Systems: Representation of numbers, binary codes, Gray code, error-detecting and error-correcting codes, registers, binary logic, basic logic gates.

Boolean Algebra: Boolean operations, Boolean functions, algebraic manipulations, minterms and maxterms, sum-of-products and product-of-sum representations, two-input logic gates, functional completeness.

Minimization of Boolean Functions: Karnaugh map, don't-care conditions, prime implicants, Quine–McCluskey technique, NAND/NOR circuits, introduction to Verilog.

Combinational Circuits: Adder, subtractor, multiplier, comparator, decoders, encoders, multiplexers, demultiplexers, Verilog models of combinational circuits.

Synchronous Sequential Circuits: Finite-state machines, latches and flip-flops (SR, D, JK, T), synthesis of clocked sequential circuits, Mealy and Moore machines, state minimization, Verilog models of sequential circuits.

Registers and Counters: Registers and shift registers, sequential adders, binary and BCD ripple counters, synchronous counters.

Algorithmic State Machines: ASM charts, ASM blocks, controller and data-path design.

Asynchronous Sequential Circuits: Analysis and synthesis, static and dynamic hazards, elimination of hazards.

Text Books:

1. M. Morris Mano and Michael D. Ciletti, Digital Design: With an Introduction to the Verilog HDL, 5th Edition, Pearson Education, 2013.
2. Zvi Kohavi and Niraj K. Jha, Swithcing and Finite Automata Theory, 3rd Edition, Cambridge University Press, 2010.

3. Randy H. Katz and Gaetano Borriello, Contemporary Logic Design, 2nd Edition, Pearson Education, 2005.
4. Joseph Cavanagh, Digital Design and Verilog HDL Fundamentals, CRC Press, 2008.

Reference Books:

5. Samir Palnitkar, Verilog HDL: A Guide to Digital Design and Synthesis, Sunsoft Press, 1996.
6. Douglas J. Smith, HDL Chip Design: A Practical Guide for Designing, Synthesizing and Simulating ASICs & FPGAs Using VHDL or Verilog, Doone Publications, 1998.
7. http://www.asic-world.com/
8. Jacob Millman and Herbert Taub, Pulse, Digital and Switching Waveforms, 3rd Edition, Tata McGraw-Hill, 2011.
9. Herbert Taub and Donald L. Schilling, Digital Integrated Circuits, Tata McGraw-Hill, 2008.

6. Engineering Mathematics- III

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Engineering Mathematics-III	**COURSE CREDIT :** 04 [3-1-0]
DEPARTMENT: Computer Sc & Engg.	**CATEGORY:** HS
CODE: 1191131	**SEMESTER:** Third
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Linear Algebra: Determinant and its properties (up to third order), Minor and cofactors, Matrices, addition, multiplication and transpose of a matrix, Symmetric and skew-symmetric matrices and their properties, Adjoint, Inverse matrix, Rank of matrix, Solution of linear system by using Gaussian elimination, LU decomposition method. Vector space, Dimension, orthogonality, projections, Gram-Schmidt orthogonalization.
Eigenvalue and Eigen vectors; positive definite matrices. Linear transformations, Hermitian and unitary matrices.

Vector Calculus: Physical significances of grad, div, curl. Line integral, surface integral, volume integral-physical examples in the context of electricity and magnetism and statements of Stokes theorem and Gauss theorem [No Proof]. Expression of grad, div, curl and Laplacian in Spherical and Cylindrical co-ordinates.

Complex Analysis: Differentiation of complex functions, Cauchy Riemann equations, Analytic functions, Harmonic functions, determination of harmonic conjugate, elementary analytic functions (exponential, trigonometric, logarithmic) and their properties; Conformal mappings, Mobius transformations and their properties. Contour integrals, Cauchy Goursat theorem (without proof), Cauchy integral formula (without proof), Liouville's theorem and Maximum Modulus theorem (without proof); Taylor's series, Zeros of analytic

functions, Singularities, Laurent's series; Residues, Cauchy residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

Text Book:

1. Advanced Higher Algebra, Chakravorty and Ghosh, U N Dhar Pvt. Ltd.ISBN 9789380673677
2. Higher Algebra, S. K. Mapa, Levant Books.
3. Integral Calculus including Differential Equations, Das and Mukherjee, U N Dhar Pvt. Ltd.ISBN: 978-9380673882
4. Differential Calculus, Das and Mukherjee, U N Dhar Pvt. Ltd. ISBN:9789380673448,
5. Advanced Engineering Mathematics, E Kreyszig, Wiley
6. S. Ponnusamy, Foundation of Complex Analysis, Narosa Publishing House, ISBN: 9788173196294

Reference Books:

7. Ghosh and Maity, An Introduction to Analysis: Differential Calculus, New Central Book Agency, 2011, ISBN: 9788173812026
8. G.F. Simmons, Differential Equations with applications and Historical Notes, CRC Press ISBN: 978-1-4987-0259-1
9. M.D. Raisinghania, Ordinary and Partial Differential Equation, S.Chand and Company, 2006 ISBN 81-219-0892-2
10. Advanced Engineering Mathematics 8e by Erwin Kreyszig is published by Wiley India
11. D. Poole, Linear Algebra – A Modern Introduction, CENGAGE Learning, 2015 ISBN: 978-81-315-30245

7. Career Advancement Skill -III

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Career Advancement Skill- III	**COURSE CREDIT :** 02 [1-0-2]
DEPARTMENT: Humanities	**CATEGORY:** MUS
CODE: 1118231	**SEMESTER:** Third
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

References:

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8. Mentored Seminar- I

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:**
NAME: Mentored Seminar- I	**COURSE CREDIT :** 01
DEPARTMENT: Computer Science & Engineering	**CATEGORY:** CS
CODE: 1117331	**SEMESTER:** Third
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

References:

SEMESTER: IV

Sl No	Course Title	Code	Credit	Type		
				L	T	P
1	Financial Management & Economics for Engineers	1246141	3	3	0	0
2	Engineering Mathematics – IV	1191241	4	3	1	0
3	Operating Systems	1113241	4	3	0	3
4	Design and Analysis of Algorithm	1113242	4	3	0	2
5	Formal Language and Automata Theory	1113243	3	2	1	0
6	Computer Programming Practices - II	1113244	4	3	0	3
7	Career Advancement Skill - IV	1118241	2	1	0	2
8	Mentored Seminar – II	1117341	1			
Total Credit (BS: 04, PC: 15, HSM: 03, PSE: 01, MUS: 02)			**25**	**30 (hrs./Week)**		

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1. Financial Management & Economics for Engineers

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Financial Management & Economics for Engineers	**COURSE CREDIT :** 03 [3-0-0]
DEPARTMENT: Computer Sc. & Engg.	**CATEGORY:** HSM
CODE: 1246141	**SEMESTER:** Fourth
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

2. Engineering Mathematics - IV

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Engineering Mathematics – IV	**COURSE CREDIT :** 04 [3-1-0]
DEPARTMENT: Computer Sc. & Engg.	**CATEGORY:** BS
CODE: 1191241	**SEMESTER:** Fourth
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Numerical Methods:
Approximation in numerical computation: Truncation and rounding errors, Fixed and floating-point arithmetic, Propagation of errors.
Interpolation: Newton forward/backward interpolation, Lagrange's and Newton's divided difference Interpolation

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Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Expression for corresponding error terms.
Numerical solution of a system of linear equations: Gauss elimination method, Matrix inversion, LU Factorization method, Gauss-Seidel iterative method.
Numerical solution of Algebraic equation: Bisection method, Regula-Falsi method, Newton-Raphson method.
Numerical solution of ordinary differential equation: Euler's method, Runge-Kutta methods, Finite Difference method.

Theory of Probability:

Axiomatic definition of probability. Conditional probability. Independent events and related problems. Bayes theorem (Statement only) & its application. One dimensional random variable. Probability distributions-discrete and continuous. Expectation. Binomial, Poisson, Uniform, Exponential, Normal distributions and related problems. t, $\chi 2$ and F-distribution (Definition only). Transformation of random variables. Central Limit Theorem, Law of large numbers (statement only) and their applications. Tchebychev inequalities (statement only) and its application.
Sampling theory: Random sampling. Parameter, Statistic and its Sampling distribution. Standard error of statistic. Sampling distribution of sample mean and variance in random sampling from a normal distribution (statement only) and related problems.
Estimation of parameters: Unbiased and consistent estimators. Point estimation. Interval estimation. Maximum likelihood estimation of parameters (Binomial, Poisson and Normal). Confidence intervals and related problems.
Testing of Hypothesis: Simple and Composite hypothesis. Critical region. Level of significance. Type I and Type II errors. One sample and two sample tests for means and proportions. $\chi 2$ - test for goodness of fit. (5L)

References:

1. A. Gupta and S.C. Bose, Mathematical Probability and Statistic, Academic Publishers.
2. W. Mendenhall, R.J. Beaver and B.M. Beaver, Introduction to Probability and Statistics, CENGAGE Learning, 2018, ISBN: 978-81-315-3304-8
3. Banerjee A., De S.K. and Sen S.: Mathematical Probability, U.N. Dhur & Sons.
4. Das N.G.: Statistical Methods, TMH.
5. Murray Spiegel, J. Schiller , R. A. Srinivasan, Debasree Goswami, Probability and Statistics (Schaum's Outline Series) Paperback – 1 Jul 2017.
6. A. Gupta and S. C. Bose, Ann introduction to Numerical Analysis, Academic Publisher, 2013, ISBN: 978-81-89781-92-7
7. M.K.Jain,S.R.K. Iyengar , & R.K.Jain: Numerical Methods for Scientific and Engineering Computation, New Age International Publications(p) Ltd. ISBN 13: 9788122433234
8. K.E. Atkinson. An Introduction to Numerical Analysis, John Wiley & Sons (1989).
9. Probability And Statistical Inference Theory And Practice by D. Bhattacharya and S. Roychowdhury (U.N. Dhur Publications)

3. Operating System

COURSE INFORMATION:

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SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Operating Systems	**COURSE CREDIT :** 04 [3-0-3]
DEPARTMENT: Computer Sc. & Engg.	**CATEGORY:** CS
CODE: 1113241	**SEMESTER:** Fourth
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Introduction: Introduction to OS, operating system functions, evaluation of OS, Different types of OS: batch, multi-programmed, time-sharing, real-time, distributed, parallel.
System Structure, Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls, Process Management.

Processes Management: Concept of processes, process scheduling, operations on processes, co-operating processes, interposes communication.
CPU scheduling: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS, SJF, RR, priority), algorithm evaluation, multi-processor scheduling.
Process Synchronization: background, critical section problem, critical region, synchronization hardware, classical problems of synchronization, semaphores.
Deadlocks: system model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Storage Management.
Threads: overview, benefits of threads, user and kernel threads.

Storage Management: *Memory management*: Background, logical vs. physical address space, swapping, contiguous memory allocation, paging, segmentation, segmentation with paging.
Virtual Memory: background, demand paging, performance, page replacement, page replacement algorithms (FCFS, LRU), allocation of frames, thrashing.
File Systems: file concept, access methods, directory structure, file system structure, allocation methods (contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance.
I/O Management: I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance.
Disk Management: disk structure, disk scheduling (FCFS, SSTF, SCAN,C-SCAN) , disk reliability, disk formatting, boot block, bad blocks.
Protection & Security Goals of protection, domain of protection, security problem, authentication, one-time password, program threats, system threats, threat monitoring, encryption.

Laboratory
1. Shell programming: creating a script, making a script executable, shell syntax (variables, conditions, control structures, functions, commands).

2. Process: starting new process, replacing a process image, duplicating a process image, waiting for a process, zombie process.
3. Signal: signal handling, sending signals, signal interface, signal sets.
4. Semaphore: programming with semaphores (use functions semctl, semget, semop, set_semvalue, del_semvalue, semaphore_p, semaphore_v).
5. POSIX Threads: programming with pthread functions (viz. pthread_create, pthread_join, pthread_exit, pthread_attr_init, pthread_cancel)
6. Inter-process communication: pipe, named pipes (FIFOs, accessing FIFO)

Text Books:
1. Milenkovie M., "Operating System : Concept & Design", McGraw Hill.
2. Tanenbaum A.S., "Operating System Design & Implementation", Practice Hall NJ.
3.

References:
1. Silbersehatz A. Galvin PB, Gang G., "Operating System Concepts", Wiley.
2. Dhamdhere, Operating System TMH
3. Stalling, William, "Operating Systems", Maxwell McMillan International Editions, 1992. 4. Dietel H. N., "An Introduction to Operating Systems", Addison Wesley

4. Design and Analysis of Algorithm

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Design and Analysis of Algorithm	**COURSE CREDIT :** 04 [3-0-2]
DEPARTMENT: Computer Sc. & Engg.	**CATEGORY:** CS
CODE: 1113242	**SEMESTER:** Fourth
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Model of computation: RAM, TM, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

Fundamental Algorithmic Strategies Brute-Force, Divide and Conquer: merge sort and quick sort, Greedy: Knapsack problem, Job sequencing with deadlines, minimum spanning tree (Prim's and Kruskal's algorithms), Dynamic Programming: matrix chain multiplication, Branch-and-Bound: 15-puzzle problem and Backtracking: N-queen problem, methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving, Bin Packing, Knapsack, TSP. Heuristics –characteristics and their application domains.

Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques, Circuit Satisfiability problem, Clique Decision Problem.

Advanced Topics: Different types of algorithms and solution of simultaneous equations, DFT & FFT algorithm; integer multiplication schemes, Approximation algorithms, Necessity of approximation scheme, performance guarantee, Polynomial time approximation schemes.

Laboratory

1. Graph Theory and Numerical Methods using C.
2. Implementation of Graph algorithms: Single Spanning Tree Generation using - BFS, DFS.
3. Minimal Spanning Tree Generation using - Prim's Algorithm, Kruskal's Algorithm,
4. Shortest Path finding using - Floyd's Algorithm, Floyd-Warshall Algorithm, Dijkstra's Algorithm, Graph Partitioning Algorithm.

Text Books:

1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson,
2. Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
3. Fundamentals of Algorithms – Horowitz Ellis, Sahani Sartaz, R. Sanguthevar
4. The Design and Analysis of algorithms-- A.Aho, J.Hopcroft and J.Ullman

Reference Books

1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition
3. Michael T Goodrich and Roberto Tamassia, Wiley.
4. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

5. Formal Language and Automata Theory

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P

School of Engineering & Technology
B. Tech Computer Science & Engineering

NAME: Formal Language and Automata Theory	**COURSE CREDIT :** 03 [2-1-0]
DEPARTMENT: Computer Sc. & Engg.	**CATEGORY:** CS
CODE: 1113243	**SEMESTER:** Fourth
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Finite State Machines: Definition, concept of sequential circuits, state table & state assignments, concept of synchronous, asynchronous and liner sequential machines.
Finite State Models: Basic definition, mathematical representation, Moore versus Mealy m/c, capability & limitations of FSM, state equivalence & minimization, machine equivalence, incompletely specified machines, merger graph & compatibility graph, merger table, Finite memory, definite, information loss less & inverse machines: testing table & testing graph.
Structure of Sequential Machines: Concept of partitions, closed partitions, lattice of closed partitions, decomposition: serial & parallel.
Finite Automation : Preliminaries (strings, alphabets & languages, graphs & trees, set & relations), definition, recognition of a language by an automata - idea of grammar, DFA, NFA, equivalence of DFA and NFA, NFA with e- moves, regular sets & regular expressions : equivalence with finite automata, NFA from regular expressions, regular expressions from DFA, two way finite automata equivalence with one way, equivalence of Moore & Mealy machines, applications of finite automata.
Closure Properties of Regular Sets: Pumping lemma & its application, closure properties minimization of finite automata: minimization by distinguishable pair, Myhill-Nerode theorem.
Context Free Grammars: Introduction, definition, derivation trees, simplification, CNF & GNF.
Pushdown Automata: Definition, moves, Instantaneous Descriptions, language recognized by PDA, deterministic PDA, acceptance by final state & empty stack, equivalence of PDA and CFL.

Closure Properties of CFLs: Pumping lemma & its applications, Ogden's lemma, closure properties, decision algorithms.
Introduction to Z. Regular language properties and their grammars. Context sensitive languages.

Text Books:
1. Hopcroft JE. and Ullman JD., "Introduction to Automata Theory, Languages & Computation", Narosa.
2. K.L.P Mishra & N. Chandrasekharan – "Theory of Computer Science", PHI
3. Lewis H. R. and Papadimitrou C. H., "Elements of the theory of Computation", P.H.I.
4. Kain, "Theory of Automata & Formal Language", McGraw Hill.

References:

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1. Kohavi ZVI, "Switching & Finite Automata", 2nd Edn., Tata McGraw Hill.
2. Linz Peter, "An Introduction to Formal Languages and Automata", Narosa
3. Ash & Ash – "Discrete Mathematics", TMH

6. Computer Programming Practices - II

COURSE INFORMATION:

SCHOOL : Engineering & Technology	**COURSE TYPE:** L-T-P
NAME: Computer Programming Practices - II	**COURSE CREDIT :** 04 [3-0-3]
DEPARTMENT: Computer Sc. & Engg.	**CATEGORY:** CS
CODE: 1113244	**SEMESTER:** Fourth
PRE-REQUISITE (If Any):	

SYLLABUS OUTLINE:

Introduction to Java programming: Java Programming Fundamentals, Introducing Classes, Objects and Methods, A closer look advantages of java, byte-code & JVM, data types, access specifiers, operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of method overloading, this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables & methods, garbage collection, nested & inner classes, basic string handling concepts.

Interfaces and Inheritance: Implementing an interface, Fundamentals of package, packages and member access, importing packages, Fundamentals of Exception handling, try, catch, throw, throws, user defined exceptions, Multilevel highierchy fundamentals. use of super and final keywords with super() method, dynamic method dispatch, use of abstract classes & methods.

Exception handling & Multithreading: Exception handling basics, different types of exception classes, use of try & catch with throw, throws & finally, creation of user defined exception classes.
Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread synchronization, interthread communication, deadlocks for threads, suspending & resuming threads.

String and I/O: Java String: Basic concept string handling methods like String(), StringBuffer() StringBuildert(), String buffer vs string builder. Some string function like charAt() , compareTo(), equals(), equalsIgnoreCase(), indexOf(), length() , substring(), toCharArray() , toLowerCase(), toString(), toUpperCase(), trim() , valueOf() methods) & StringBuffer classes (discuss append(), capacity(), charAt(), delete(), deleteCharAt(), ensureCapacity(), getChars(), indexOf(), insert(), length(), setCharAt(), setLength(), substring(),

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toString() methods, concept of mutable and immutable string, command line arguments, basics of I/O operations – keyboard input using BufferedReader & Scanner classes.

Applet Programming and Swing: Basics of applet programming, applet life cycle, difference between application & applet programming, parameter passing in applets, concept of delegation event model and listener, I/O in applets, use of repaint(), getDocumentBase(), getCodeBase() methods, layout manager (basic concept), creation of buttons (JButton class only) & text fields.

Laboratory

1. Assignments on class, constructor, overloading, inheritance, overriding.
2. Assignments on wrapper class, vectors, arrays.
3. Assignments on developing interfaces- multiple inheritance, extending interfaces
4. Assignments on creating and accessing packages.
5. Assignments on multithreaded programming, handling errors and exceptions, applet programming and graphics programming.
6. Use of CASE tools.

Text:

1. "The JAVA Server Programming", J. Gosling, K. Arnold, D. Holemes, Pearson Publication
2. "A Programmer's Guide to Java Scjp Certification: A Comprehensive Prime", Khalid A. Mughal, Pearson Publication

References:

1. Herbert Schildt and Dale Skrien, Java Fundamentals – A Comprehensive Introduction, (1e), McGrawHill, 2015
2. Dietel and Dietel, Java How to Program, (9e), Prentice Hall India, 2012

SEMESTER: V

Sl No	Course Title	Code	Credit	Type		
				L	T	P
1	Database Management System	1113252	4	3	0	3
2	Compiler Design	1113253	4	3	0	2
3	Operations Research	1113154	4	3	1	0
4	Elective-I (Open)	1**5151	3	2	1	0
5	Elective-I (Professional)	1114251	4	3	0	2
6	Career Advancement Skill - V	1118252	2	1	0	2
8	Mentored Seminar – III	1117351	1			
Total Credit (PC: 12, OE: 03, PE: 04, PSE: 01, MUS: 02)			22	26 (hrs./Week)		

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SEMESTER: VI

Sl No	Course Title	Code	Credit	Type		
				L	T	P
1	Software Engineering	1113261	4	3	0	3
2	Computer Networks	1113262	4	3	0	3
3	Elective – I (Open)	1**5161	3	2	1	0
4	Elective – II (Professional)	1114161	3	2	1	0
5	Elective – III (Professional)	1114262	4	3	0	2
6	Career Advancement Skill - VI	1118261	2	1	0	3
7	Mentored Seminar – IV	1117351	3			
Total Credit (PC: 08, PE: 07, OE: 03, PSE: 03 MUS: 02)			23	27 (hrs./Week)		

SEMESTER: VII

Sl No	Course Title	Code	Credit	Type		
				L	T	P
1	Project Management and Entrepreneurship Skill	1247171	3	2	1	0
2	Elective-III (Open)	1**5171	3	2	1	0
3	Elective- IV (Professional)	1114171	3	2	1	0
4	Elective- V (Professional)	1114272	4	3	0	2
5	Project – II	1117372	3	0	0	6
6	Constitution of India	1238171	2	2	0	0
7	Summer Training	1117373	3			
Total Credit (PE: 07, OE: 03, HSM: 03, PSE: 06, MUS:02)			21	22 (hrs./Week)		

SEMESTER: VIII

	Course Title	Code		Type

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Sl No			Credit	L	T	P
1	Elective- IV (Open)	1**5181	3	2	1	0
2	Elective- VI (Professional)	1114181	3	2	1	0
3	Project-III	1117382	6	0	0	12
4	Comprehensive Viva	1117384	4			
Total Credit (PE: 03, OE: 03, PSE: 10)			**16**	**17 (hrs./Week)**		

1.