SYLLABUS

FOR

FIRST YEAR

B.TECH PROGRAMMES

(Effective from 2023-24)

MBA PROGRAMME

INTEGRATED MBA PROGRAMME

MCA PROGRAMME

(Effective from 2024-25)

2024-25

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA

ROURKELA

CONTENT

SYLLABUS

FOR

FIRST YEAR

B.TECH PROGRAMME

(Effective from 2023-24)

2024-25

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA

ROURKELA

COURSE STRUCTURE

COMMON TO ALL BRANCHES

FIRST SEMESTER

Category	Subject Code	Subject	L-T-P	Credit	University Marks	Internal Marks
THEORY						
1. BS	23BS1001	Mathematics - I	3-0-0	3	100	50
2. BS	23BS1002	Physics /	3-0-0	3	100	50
BS	23BS1003	Chemistry				
3. ES	23ES1001	Basic Electrical Engineering /	2-0-0	2	100	50
ES	23ES1002	Basic Electronics				
4. ES	23ES1003	Programming in C and Data Structure /	3-0-0	3	100	50
ES	23ES1004	Engineering Mechanics				
5. ES	23ES1005	Basic Civil Engineering /	2-0-0	2	100	50
ES	23ES1006	Basic Mechanical Engineering				
6. HS	23HS1001	Universal Human Values /	2-0-0	2	100	50
HS	23HS1002	English for Technical Writing				
	Total		**15-0-0**	**15**	**600**	**300**
SESSIONAL / PRACTICAL						
7. BS	23BS1201	Physics Lab. /	0-0-3	1.5	-	100
BS	23BS1202	Chemistry Lab.				
8. ES	23ES1201	Basic Electrical Engineering Lab./	0-0-3	1.5	-	100
ES	23ES1202	Basic Electronics Lab.				
9. ES	23ES1203	Programming Lab. /	0-0-3	1.5	-	100
ES	23ES1204	Communicative English & Report Writing Lab.				
10. ES	23ES1205	Engineering Graphics & Design Lab. /	0-0-3	1.5	-	100
ES	23ES1206	Workshop & Digital Manufacturing Lab.				
11. MC	23MC1201	Sports / Yoga / NCC / NSS	0-0-2	1	-	100
		Total	**15-0-14**	**07**	**-**	**500**
		Total Semester		**22**	**600**	**800**
		Grand Total (Theory + Practical) = 1400				

SECOND SEMESTER

Category	Subject Code	Subject	L-T-P	Credit	University Marks	Internal Marks
THEORY						
1. BS	23BS1004	Mathematics - II	3-0-0	3	100	50
2. BS	23BS1003	Chemistry /	3-0-0	3	100	50
BS	23BS1002	Physics				
3. ES	23ES1002	Basic Electronics /	2-0-0	2	100	50
ES	23ES1001	Basic Electrical Engineering				
4. ES	23ES1004	Engineering Mechanics /	3-0-0	3	100	50
ES	23ES1003	Programming in C and Data Structure				
5. ES	23ES1006	Basic Mechanical Engineering /	2-0-0	2	100	50
ES	23ES1005	Basic Civil Engineering				
6. HS	23HS1002	English for Technical Writing /	2-0-0	2	100	50
HS	23HS1001	Universal Human Values				
	Total		**15-0-0**	**15**	**600**	**300**
SESSIONAL / PRACTICAL						
7. BS	23BS1202	Chemistry Lab. /	0-0-3	1.5	-	100
BS	23BS1201	Physics Lab.				
8. ES	23ES1202	Basic Electronics Lab./	0-0-3	1.5	-	100
ES	23ES1201	Basic Electrical Engineering Lab.				
9. ES	23ES1204	Communicative English & Report Writing Lab. /	0-0-3	1.5	-	100
ES	23ES1203	Programming Lab.				
10. ES	23ES1206	Workshop & Digital Manufacturing Lab. /	0-0-3	1.5	-	100
ES	23ES1205	Engineering Graphics & Design Lab.				
11. MC	23MC1202	Sports / Yoga / NCC / NSS	0-0-2	1	-	100
		Total	**15-0-14**	**07**	**-**	**500**
		Total Semester		**22**	**600**	**800**
		Grand Total (Theory + Practical) = 1400				

23BS1001 MATHEMATICS - I (3-0-0)

Course Objective : The goal of this course is to achieve conceptual understanding and to retain the best traditions of traditional calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as single variable and multivariable calculus and plays an important role in the understanding of science, engineering and also other disciplines.

Module - I (08 hrs)
Basic Calculus: Applications of definite integrals to evaluate length of curves, areas of surfaces and volumes of surfaces of revolution, Improper integral (Definition and Elementary Examples),Beta and Gamma functions and their properties.

Module - II (08 hrs)
Single-variable Calculus (Differentiation): Rolle's Theorem, Mean value theorem (Statement and applications), First derivative test for local extreme values of functions. Power series, Taylor and Maclaurin series.

Module - III (08 hrs)
Multivariable Calculus (Differentiation): Partial derivatives. Jacobians, Hessian Matrix. Maxima, Minima and saddle points. Method of Lagrange multipliers.

Module - IV (08 hrs)
Linear Algebra: Vector Space, Basis and dimension, Linear Systems of Equations, Gauss elimination, Linear Dependence and Independence, Rank of a Matrix.

Module - V (08 hrs)
Linear Algebra:Inverse of a matrix (Gauss-Jordan). Symmetric, skew-symmetric and orthogonal matrices. Eigen values and eigenvectors. CaleyHamilton Theorem (Statement only)

Essential Reading:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

Supplementary Reading:

1. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
2. Gilbert Strang, Introduction to Linear Algebra, 5th Edition, 2016.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

Course Outcomes:
CO1: To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.

CO2: The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
CO3: The tool of power series for learning advanced Engineering Mathematics.
CO4: To deal with functions of several variables that are essential in most branches of engineering.
CO5: Learn how to convert a real life problem into a matrix system and solve it.

23BS1002 PHYSICS (3-0-0)

Course Objective: To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

Module I (09 Hrs)
OSCILLATIONS : Mechanical and electrical simple harmonic oscillators, damped harmonic oscillator – heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators, steady state motion of forced damped harmonic oscillator

Module II (09 Hrs)
WAVES AND OPTICS : Concept of wave and Wave equation, Superposition of many harmonic waves, Concept of coherent sources (Division of wave front and division of amplitude), Interference in thin parallel film, Newton's ring: Determination of wavelength of light, Refractive index of liquid).Concept of diffraction (Huygen's Principle), Types of diffraction, Franhoffer diffraction due to single slit, diffraction grating (qualitatively).

Module III (09 Hrs)
ELCTROMAGNETISM : Vector calculus: Gradient, Divergence, Curl (Mathematical concept), Gauss divergence theorem and Stoke's theorem(statement only), Derivation of Maxwell's electromagnetic equation in differential form and integral form, Electromagnetic wave equations for E and B in vacuum and conducting medium, transverse nature of EM waves.

Module IV (09 Hrs)
QUANTUM PHYSICS : Wave particle duality, concept of phase velocity group velocity, relation between them, Matter waves (de Broglie hypothesis), Wave functions, Observables as operators, Eigen function and Eigen values, Normalization, Expectation values, Schrodinger equation (Time dependent and time independent), Particle in a box.

Module V (08 Hrs)
LASERS : Introduction to Laser, Characteristics of Lasers, Einstein's coefficients and relation between them, Lasing action, Population inversion, Three and four level pumping schemes, Ruby Laser, He-Ne Laser.

Essential / Supplementary Readings:

1. Ian G. Main, Oscillations and waves in physics, Cambridge University Press
2. H.J. Pain, The physics of vibrations and waves, John Wiley & Sons Ltd.
3. E. Hecht, Optics, Pearson Education Ltd.
4. A. Ghatak, Optics, McGraw Hill Publisher
5. O. Svelto, Principles of Lasers, Springer

Course Outcome: At the end of this course students will demonstrate the ability to

CO1: Demonstrate proficiency and perceptive of the basic concepts in physics.

CO2: Utilize the scientific and experimental methods to investigate and verify the concepts related to content knowledge.

CO3: Exploring the engineering applications and apply quantum mechanics to engineering Phenomena.

CO4: Identifying the relevant formulae and work out engineering problems.

CO5: Comprehend principle, concept, working and application of new technology and comparison of results with theoretical calculations.

CO-PO Mapping:

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

23BS1003 CHEMISTRY (3-0-0)

Module–I: (9Hours)

PERIODIC PROPERTIES : Periodic Properties, Effective Nuclear Charge, Penetration of Orbitals, Variations of s, p, d and f Orbital Energies of Atoms in the Periodic Table, Electronic Configurations, Atomic andIonic Sizes, Ionization Energies, Electron Affinity and Electronegativity, Polarizability, Oxidation States.

Module–II: (9 Hours)

FREE ENERGY IN CHEMICAL EQUILIBRIA : Concepts of Entropy, Entropy in Physical and Chemical Changes, Free Energy Concepts, Gibbs Helmholtz Equation, Free Energy Change and Criterion of Spontaneity of Chemical Equation and Chemical Equilibrium, Van't Hoff Equation.

Module–III: (9 Hours)

SPECTROSCOPIC TECHNIQUES AND APPLICATIONS : Basic Terms and Principles of Spectroscopy Molecular Rotational (Microwave) Spectroscopy: Basic Principle and Application toDiatomic Molecules, Selection Rules.

Molecular Vibrational (IR) Spectroscopy: Basic Principle, Types of Vibrations , VibrationalFrequency, Selection Rules.

Electronic (UV-Visible) Spectroscopy: Laws of Absorption, Basis Principle, Types ofElectronic Transitions, Chromophores and Auxochrome.

Module–IV: (9 Hours)

STEREOCHEMISTRY : Structural and Stereoisomer (Geometrical and Optical), Symmetry and Chirality, Enantiomers, Diastereomers, Optical Activity, Configurational and Conformational Analysis,Representations of Three Dimensional Structures (E, Z and R,S only).

Module–V: (9 Hours)

ORGANIC REACTIONS AND SYNTHESIS : Introduction to Reaction Intermediates {Carbocation, Carbanion, Free Radial (Formation, structure and stability)}, Reactions involving Substitution, Addition, Elimination (Examples and Mechanisms).

Essential Reading:

1. Engineering Chemistry: fundamental to Applications by Shikha Agarwal, CambridgeUniversity Press, Second Edition, 2019.
2. Engineering Chemistry by B. Rama Devi, P. Aparna, and PrasantaRath, CengageLearning, First Edition, 2023.

Supplementary Reading:

1. Atkins' Physical Chemistry by Peter Atkins, Julio de Paula, and James Keeler, OxfordUniversity Press, Eleventh Edition, 2018.
2. Principles of Physical Chemistry by B. R. Puri, L. R. Sharma, and Madan S. Pathania,Vishal Publishing, Forty Eighth Edition, 2021.
3. Fundamentals of Molecular Spectroscopy by C.N. Banwell and E.M. MacCash,5thEdition, McGraw-Hill Education, Fourth Edition, 2017.
4. Concise Inorganic Chemistry by J.D Lee, Oxford University Press; Fifth Edition, 2008.
5. Principles of Inorganic Chemistry by B.R. Puri, L.R. Sharma, and K.C. Kalia, VishalPublishing, Fifty Fifth Edition, 2020.
6. Stereochemistry: Conformation and Mechanism by P.S. Kalsi, New Age International,Eighth Edition, 2015.
7. Organic Chemistry Concepts and Applications by Jagdamba Singh, PragatiPrakashan,Eighth Edition, 2015.
8. Organic Chemistry byR.T. Morrison andR.N. Boyd, Pearson Education, Seventh Edition,2010.
9. Organic Chemistry: Structure and Function by P. Volhardt and N. Schore, WH Freeman;Eighth Edition, 2018.

Course Outcomes:

CO1: To demonstrate and realise the trend in various periodic properties associated withdifferent elements present in different groups and periods of modern periodic table.

CO2: To acquire the knowledge of free energy concept for the thermodynamics associatedwith chemical reactions and equilibriums.

CO3: To analyze and implement the concepts of spectroscopic techniques for identificationof various organic and inorganic compounds.

CO4: To evaluate and visualize the concept of configurations and conformations of variousorganic compounds

CO5: To assess the generation, reaction and identification of intermediates involved duringorganic reactions and their applications in different organic reaction mechanisms.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	1	2	2	2	3
CO2	3	2	2	2	0	0
CO3	3	1	2	2	2	2
CO4	3	1	2	2	1	1
CO5	3	2	2	2	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

23ES1001 BASIC ELECTRICAL ENGINEERING (2-0-0)

MODULE I: (6 Hrs)
D.C Networks: Kirchoff's laws, node voltage and mesh current methods, delta-star and star-delta conversions, superposition principle, Thevenin's and Norton's theorems, Maximum Power Transfer Theorem.

MODULE II (6 Hrs)
Single phase and three phase ac circuit: Average and effective values of sinusoids, solution of R, L, C series circuits, solution of series and parallel circuits, series -parallel resonance. Line and phase quantities, Delta and star connections, solution of the balanced three phase circuits, measurement of power in three phase circuits.

MODULE III (6 Hrs)
Magnet circuit & principle of electromechanical energy conversion: Review of fundamental laws of electromagnetic induction, Solution of simple magnetic circuits. DC machine: Construction, types, emf equation of generator, torque equation of motor, speed control of DC motors

MODULE IV (6 Hrs)
AC MACHINES: Single Phase Transformer: Construction, emf equation, no load and load operation, voltage regulation and efficiency. Three Phase Induction Motor: Construction, principle of working, concept of slip, torque speed relation. Principle of operation of Three Phase alternator.

MODULE-V (6 Hrs)
Introduction to Power System: General structure of electrical power systems, Concepts of Generation, Transmission and Distribution, Sources of Electrical Power

ESSENTIAL READING

1. G. Rizzoni, Principles and Applications of Electrical Engineering, TMH , 2017
2. Nagrath I.J. and D. P. Kothari, Basic Electrical Engineering, Tata McGraw Hill.

SUPPLEMENTARY READING

1. S. Parker Smith, "Problems in Electrical Engineering", Asia Publications, 10th Edition.
2. Edward Hughes (revised by Ian McKenzie Smith), "Electrical & Electronics Technology", Pearson Education Limited. Indian Reprint 2002, 10th Edition.

Course Outcomes:
Upon completion of the subject the students will demonstrate the ability to:
CO1 Implement principles of DC network, theorems and transients.
CO2 Analyze the concept of Single phase and three phase AC circuits.
CO3 Express the concept of magnetic circuit and DC machines.
CO4 Apply basic principles of AC machines and their working.
CO5 Demonstrate basic principles of power system

Course Articulation Matrix

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

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Course	3	3	2	1	1	2	1	-	-	-	-	1

23ES1002 BASIC ELECTRONICS (2-0-0)

COURSE OBJECTIVE:

1. To impart the fundamentals of semiconductor devices and their applications to various circuits.
2. To impart the knowledge offundamentals of digital electronics and Integrated Circuits (IC).
3. To impart the knowledge of electronic measuring instruments and fundamentals of communication systems.

MODULE I (7 Hrs)

SemiconductorPhysics:Properties of semiconductor, current flow in semiconductors, voltage -current characteristic of a p-n junctions, Rectifiers Bipolar junction Transistor (BJT): Device structure, types and modes of operation, static characteristic, BJT as a switch, BJT as an amplifier, conceptof biasing of BJT

MODULE II (7 Hrs)

JFET: Physical structure, operation and static characteristics
MOSFET: Physical structure, operation and characteristics ofD- andEtype MOSFET Integrated Circuits: Introduction to CMOS technology in VLSI,Introduction to Integrated circuits, Fabrication of monolithic IC, Integration of circuit components, Limitations of VLSI

MODULE III (6 Hrs)

Feedback Amplifiers: General feedback structure, properties of negative feedback, four basic types of feedback topologies (Block diagram only) Operational Amplifier (OP-AMP): Ideal OP-AMP, inverting configuration, non-inverting configuration, OP-AMP Applications (Adder, Subtractor only)

MODULE IV (5 Hrs)

Digital Electronicsfundamentals-Number system (Decimal, Binary, Octal and Hexadecimal), conversion amongnumber systems, signed-binary numbers, binary addition, subtraction, multiplication and division, logic gates, laws of Boolean Algebra,simplification of expressions

MODULE V (5 Hrs)

Electronic Instruments: Overview of CRO, DSO; principles of operation, waveform reconstruction, Comparison between CRO & DSO, applications of oscilloscope

Principles of Communication Systems: Fundamentals of AM & FM, (Waveforms and general expressions only)

ESSENTIAL READING

1. Electronics Fundamentals and Applications, D. Chattopadhyay and P.C. Rakshit, New Age International Publications. (Selected portions fromchapters)
2. Electronic Devices & Circuit Theory, R.L. Boylestad and L.Nashelsky, PearsonEducation.

SUPPLIMENTARY READING

1. Integrated Electronics, Millman and Halkias, TMHPublications.
2. Microelectronics Circuits, A.S Sedra, K.C. Smith, Oxford UniversityPress.
3. VLSI Design, Debaprasad Das, Oxford University Press.
4. Electrical & Electronics Measurement and Instrumentation, A.K. Sawhney, Dhanpat Rai & Co(Pvt.) Ltd

COURSE OUTCOME: After completion of the course, students should be able to

1. Understand theoperationand application of semiconductor devices.
2. Analyze characteristics of FETs.
3. Apply the Feedback Amplifiers and Operational Amplifiers.
4. Remember the fundamentals of different Digital arithmetic operations

23ES1003 PROGRAMMING IN C AND DATA STRUCTURE (3-0-0)

Pre-requisites Fundamentals of Computers

Course Objectives:

1. Learn fundamentals of C programming
2. Learn various steps of program development and implementation
3. Learn different Data Structures for structured programming approach
4. Learn relation of memory and memory referencing with the program execution
5. Learn to implant small projects

Module I (10 Hrs)

Fundamentals of C

Problem-solving processes: Algorithms and Flow Chart. C as a Middle-level language, Structure of C program, Character set Identifiers, Keywords, Data Types, Constant and Variables, Statements, Input and Output statements, Operators and Expressions, Precedence of operators, Control Structures (If, Ifelse, Switch-case, For loop, While, do-While)

Module II (9 Hrs)

Function, Array, Structure and Union Functions (Built-in, user-defined), Recursive function. Array: 1 – D, 2 – D, Matrix operations, String, Passing Array to Function, Structure, Union.

Module III (8 Hrs)

Pointer & Dynamic Memory Allocation

Pointer Arithmetic, Parameter passing using pointers, Call by value vs. Call by reference, Passing parameters, pointer to pointer, pointer to function, Pointer to Structure, Array and pointers, Static vs. Dynamic memory, Pointer variables, Dynamic memory allocation functions [malloc (), calloc (), realloc (), free ()]

Module IV (7 Hrs)
Data Structures
Introduction to Data Structure, Linear Linked List: Creation, Insertion, Deletion. Stack, Stack applications (Infix to postfix, postfix evaluation), Queue (linear & circular)

Module V (6 Hrs)
Tree, Introduction to Sorting & Searching Binary Tree, Binary Search Tree, Sorting (Bubble Sort, Quick Sort), Searching (Linear Search, Binary Search)

Essential Readings:
1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. Programming in C, Pradip Dey, Manas Ghosh, Oxford Publication
3. Data Structures - (Schaum's Outlines), McGraw-Hill Education

Supplementary Readings:
1. Let us C- Yashwant Kanetkar, BPB Publications.
2. Programming with ANSI and Turbo C- Kamthane, A. N. Pearson Education
3. R. S. Salaria, Programming for Problem Solving, Khanna Publishing House
4. The C Programming Language – Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall.
5. Data Structures Using C - Amiya Kumar Rath, Alok Kumar Jagadev, Scitech Publications.

Course Outcomes:
The students will learn and able to
1. Remember, understand and implement simple algorithms to C programs.
2. Test and execute programs using function, array, structure and union.
3. Analyze the relation of memory and memory referencing with the program execution.
4. Apply different Data Structures for problem solving.
5. Implement different sorting and searching algorithms.

23ES1004 ENGINEERING MECHANICS (3-0-0)

Module I (10 Hrs)
Concurrent forces on a plane: Composition, resolution and equilibrium of concurrent coplanar forces, method of moment. General case of forces on a plane: Composition and equilibrium of forces in a plane, plane trusses, method of joints and method of sections.

Module II (6 Hrs)
Friction: Fundamentals and Problems involving friction, Ladder, Wedges. Principle of virtual work.

Module III (8 Hrs)
Parallel forces on a plane: General case of parallel forces, center of parallel forces and center of gravity, Centroid of plane and composite figures, Theorems of Pappus and Guildins. Moment of inertia: Plane figure with respect to an axis in its plane and perpendicular to the plane, Polar moment of inertia, parallel axis theorem.

Module IV (8 Hrs)
Rectilinear translation: Kinematics, Principle of dynamics, D Alembert?s Principle, Principle of work and energy for a particle and a rigid body, Conservation of energy, Principle of impulse and momentum for a particle and a rigid body, Conservation of momentum, System of rigid bodies, Impact, direct and central impact, coefficient of restitution.

Module V (8 Hrs)
Curvilinear translation: Kinematics, Equation of motion, Projectile, D Alembert?s principle of curvilinear motion. Kinematics of rotation of rigid body.

Essential Reading:
1. Engineering Mechanics: S. Timoshenko, D.H. Young, J.V. Rao, Sukumar Pati,5th Edition,2017 McGraw Hill.

Supplementary Reading:
1. Engineering Mechanics, Static and Dynamics, J. L. Meriam and L.G.Kraige, 9th Edition,2021, John Wiley & Sons, Inc.
2. Fundamental of Engineering mechanics, S Rajesekharan& G ShankaraSubramanium,3rd Edition, 2017, S. Chand .
3. Engineering mechanics: K. L. Kumar andVeenuKumar, 4th Edition,2017, Tata MC Graw Hill.

Upon completion of the subject the students will be able to:
CO1 Ability to analyze objects in static equilibrium including the determination of reactions, forces and moments.
CO2 Enrichfundamental concept offriction and demonstrate the analytical skills to solve the problems involving friction.
CO3 Assimilatingthe knowledge for determination of centroid and second moment of area of sectionsand their engineering applications.
CO4 To analyze the work done by forces, the energy transferred from one object to other and apply principle of work and energy conservation for realistic (/Practical) engineering problems.
CO5 Identify the various parameters in projectile motion. Apply the principle of dynamics to analyze the curvilinear motion of rigid bodies.

Course Articulation Matrix

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

Program Articulation Matrix Row for this Course

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

23ES1005 BASIC CIVIL ENGINEERING (2-0-0)

Module I (6 Hrs)
Introduction to Civil Engineering: Various disciplines of Civil engineering, Importance of Civil engineering in infrastructure development of the country, interdisciplinary nature of construction projects. Residential Buildings: NBC Classification, Basic Components of a building: Basic requirement. Planning and Design of buildings: fundamental requirements, selection of sites, Introduction to building design: functional and structural design. Foundations: Classification, Bearing Capacity of Soil and related terms (definition only)

Module II (6 Hrs)
Fundamental Properties of Construction Materials: Physical, mechanical and durability properties. Construction materials: stone, bricks, cement, aggregate, mortar, concrete, timber, steel, non-ferrous metals, paint, plastic, glass, adhesive, tiles, composites(Definition, classification and application)

Module III (6 Hrs)
Importance of Transportation, Transportation modes i.e. Highway, railway, airways, water, pipe and conveyor – Basic Characteristics, advantages and disadvantages. Indian road transport system: Types of roads, classification of highway, urban roads: basic requirements and classification. Basic Components of a Road, Rigid and Flexible pavement (comparison only)

Module IV (6 Hrs)
Quantity of water: Sources of water, Per capita demand, drinking water standards, Public Water Supply System: Necessity and Basic lay out. Conventional water treatment process: Screening, Plain Sedimentation, Sedimentation aided with Coagulation, Filtration, and Disinfection (working principles only).

Module V (6 Hrs)
Irrigation: Importance of Irrigation, Classification of Irrigation projects, Irrigation system: Types, Field water distribution, Multipurpose river valley projects, Dams: Purpose, types. Layout of canal Irrigation system: components and definitions.

Essential Reading:

1. Basic Civil engineering, Gopi, S., Pearson Publication
2. Basic Civil Engineering, Bhavikatti, S. S., New Age.

Course Outcomes:
1. Able to understand the basics of civil engineering and fundamental aspects of building.
2. Able to get the brief overview of general aspect of building material.
3. Able to get brief idea about transportation modes and planning.
4. Able to get brief idea about drinking water standards and water treatment plant.
5. Able to get brief idea about irrigation network system.

23ES1006 BASIC MECHANICAL ENGINEERING (2-0-0)

MODULE-I (11 Hrs)

Thermodynamics: Systems, Properties, Process, State, Cycle, Internal energy, Enthalpy, Zeroth Law, First law and Second Law of Thermodynamics, Basic Concept Entropy, Properties of ideal gas, Properties of pure substances, Enthalpy, Specific volume, Internal energy and dryness fraction of steam, use of Steam tables. Related numerical.

MODULE-2 (8 Hrs)

Application of Thermodynamics: Single stage air compressor, Steam Power Plant, I.C. Engines (Brief Description on working principles with Schematic diagrams only)

Elements of Fluid Mechanics and Heat Transfer Properties used in Fluid Mechanics, Fluid Statics, Kinematics and Dynamics (Concepts only), Heat transfer and Classifications (Concepts only)

MODULE-3 (7 Hrs)

Introduction to Manufacturing: Classification of engineering materials, Material Properties, Manufacturing processes: Welding, Casting, Forming (Basics only)

MODULE-4 (4 Hrs)

Basic Power transmission devices: Belt, Gear drives, clutch, brakes. (Working principle only)

Introduction to Robotics: Robot anatomy, Joints and links and common robot configurations.

Essential Reading

1. Basic Mechanical Engineering by Pravin Kumar, Pearson
2. Basic Mechanical Engineering by A R Israni, P K Shah, BS Publications3. Text book of Elements of Mechanical Engineering, S T Murthy, Universities press
3. Basic and applied Thermodynamics by P. K. Nag, Tata McGraw Hill

Supplementary Reading

1. Basic Mechanical Engineering by.D. Mishra, P. KParida, S.S.Sahoo, India Tech Publishing company
2. Elements of Mechanical Engineering by J K Kittur and G D Gokak,Willey
3. Basic Mechanical Engineering by BasantAgrawal, C M Agrawal,Willey
4. Engineering Thermodynamics by P. Chattopadhaya, Oxford University Press

COURSE OUTCOMES

CO1: Comprehending the Law of Thermodynamics

CO2: Being aware of how crucial thermodynamics is to IC engines, power plants, refrigerators, and Heat Pump

CO3: Being aware of fluid mechanics and heat transfer concepts

CO4: Recognizing the functions of Engineering materials

CO5: Have a fundamental understanding of welding, Casting, Forming and other manufacturing techniques.

CO6: Recognizing fundamental power transfer mechanisms and aware of the fundamental robotics system.

23HS1001 UNIVERSAL HUMAN VALUES (2-0-0)

UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

Module 1- Foundations of Value Education

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity - the Basic Human Aspirations, Happiness and Prosperity-Current Scenario, Method to Fulfil the Basic Human Aspirations.

Module 2-Harmony in the Human Life, Relationships and Society

Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, Achieving Harmony: Integrating Self and the Body, Harmony in the Family and Society, 'Trust'& 'Respect'–as Foundational Values in Relationship, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society & Universal Human Order.

Module 3-Harmony in the Nature/Existence & Professional Ethics

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence, Natural Acceptance of Human Values, Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics – Ethical Decision Making&Transition towards Value-based Life and Profession.

23HS1002 ENGLISH FOR TECHNICAL WRITING (2-0-0)

Course Objective:

1. To develop awareness about the complexity of the communication process.
2. To provide learning environment to practice listening, speaking, reading and writingskills.
3. To assist the students to carry on the tasks and activities through guided instructions and materials.
4. To develop effective writing skills so as enable students to write in a clear, concise, persuasive manner
5. To acquaint students with a variety of forms of writing in professional world.
6. To effectively integrate English language learning with employability skills and training.

Module - I (6 Hrs)
Fundamentals of Technical Communication
1. Process of communication, types of communication (Verbal & Non Verbal)
2. Channels of business communication
3. Barriers to communication.
4. Bias free language
5. Cross-cultural communication

Module - II (6 Hrs)
Communicative Grammar Hours
1. Time and Tense
2. Passive and active voice
3. English Conditionals

Module - III (6 Hrs)
Sounds of English Hours- 06
1. Consonant sounds of English
2. Vowel sounds of English
3. Stress pattern: Syllable, Stress and Intonation.
4. Problem sounds for Indian speakers

Module - IV (6 Hrs)
Professional Communication for Workplace
Paragraph writing (The Seven Cs of Good Professional Writing)
Formal Letter Writing
Memo and Notice writing
Agenda and Minute writing
Report Writing

Module - V (6 Hrs)
Professional Communication for Employment
1. CV writing
2. Interview skills

Essential Reading:
1. Effective Technical Communication by M Ashraf Rizvi (Tata McGraw Hill)
2. Better English Pronunciations By J. D.O Conner (Cambridge University Press)

Course Outcome:
At the end of this course students will demonstrate the ability to
CO1: Understand the concept and nature of communication and the objective of Technical Communication relevant for the work place as Engineers.
CO2: Use suitable vocabulary and grammar with confidence and express their ideas both in speech and writing.
CO3: Evaluate their efficacy as fluent and efficient communicators by learning the voice-dynamics.
CO4: Write flawless business correspondence like formal letters, memos, notices, reports

23BS1201 PHYSICS LABORATORY (0-0-3)

List of Experiments:

1. Determination of acceleration due to gravity by using Bar pendulum
2. Determination of wave length of monochromatic light with the help of Newton's ring apparatus.
3. Determination of grating element of a diffraction grating using spectrometer
4. Study of resonance using sonometer for unknown frequency
5. Study of RLC Circuit
6. Determination of surface tension of water by capillary rise method
7. To draw the characteristics of a bipolar junction transistor
8. To determine the rigidity modulus of the material of a wire by using Barton's apparatus.
9. To determine e/m ratio
10. Magnetic field measurement from Helmholtz coil

Course Outcomes: Upon completion of the subject the students will demonstrate the ability to:

CO1 Express the idea of calculation of acceleration due to gravity at any place using the concept of oscillatory system and simple harmonic motion.
CO2 Demonstrate the working and operational technique to calculate the mechanical properties of fluid and other materials.
CO3 Evaluate the voltage, current, power and characteristics behaviour of the electronic devices.
CO4 Understanding the rigidity concept of solid materials.
CO5 Analyzing the electrical and magnetic field measurements and their applications.

Course Articulation Matrix

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

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

23BS1202 CHEMISTRY LABORATORY (0-0-2)

Chemistry Laboratory (Any Ten Experiments):

1. Determination of the alkalinity in the given water sample.
2. Determination of the temporary and permanent hardness in the given water sample by complexometric titration using EDTA as standard solution.
3. Determination of amount of available chlorine in bleaching powder.
4. Standardization of potassium permanganate using sodium oxalate
5. Determination of amount of ferrous iron present in Mohr's salt.
6. Determination of the rate constant of a chemical reaction.
7. Estimation of calcium in Limestone

8. Determination of dissolved oxygen in water sample.
9. Determination of the partition coefficient of a chemical between two immiscible liquids.
10. Determination of the strength of given HCl solution by titrating it against NaOH solutionusing pH meter.
11. Conduct metric titration of strong acid and strong base.
12. Determination of viscosity of lubricating oil by Redwood viscometer.
13. Determination of flash point of a given oil by Pensky-Martens flash point apparatus.
14. To find out the concentration of a given potassium permanganate solution spectrophotometric method.
15. Synthesis of Aspirin/Paracetamol.

Essential Reading:

1. Practical Chemistry by D.N. Bajpai, O.P. Pandey and S. Giri, S. Chand Publishing,Revised Edition, 2010.
2. Practical Physical Chemistry by B. Vishwanathan and P.S. Raghavan, Viva Books, FirstEdition, 2012.

Course Outcomes:

CO1: To analyze the alkalinity and hardness value of the water sample.
CO2: To analyze the concentration of copper present in the solution.
CO3: To analyse kinetics of the reactions.
CO4: To gain hands-on experiences of pH meter, conductometer, and spectrophotometer.
CO5: To analyze viscosity and flash point of lubricating oils.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	2	3	2	2	2
CO2	3	2	3	2	2	2
CO3	3	2	3	2	2	2
CO4	3	2	3	2	2	2
CO5	3	2	3	2	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix Row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6
Course	3	2	3	2	2	2

23ES1201 BASIC ELECTRICAL ENGINEERING LABORATORY (0-0-3)

List of Experiments

1. Preliminary: Preparation of symbol chart for various systems & components as per ISS, to study the constructional & operational features for Voltmeter, Ammeter, Wattmeter, Frequency meter, multi-meter and Rheostat, Study of safety rules.
2. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and singlephase induction machine.
3. Measurement of the armature & field resistance of D.C. Machine by volt-amp method.
4. Starting and speed control of a D.C. shunt motor

5. Study of BH Curve of ferromagnetic core.
6. Determination of open circuit characteristics (O.C.C) of D.C shunt generator when separately excited at different speeds and different excitation levels.
7. Calibration of a single-phase Energy Meter by direct loading.
8. Measurement of power & power factor of a single-phase circuit
9. Measurement of earth resistance and insulation resistance.
10. Verification of Thevenin and Norton's theorem

Course Outcomes

Upon completion of the subject the students will demonstrate the ability to:

CO1 Express the safety rules as per ISS and symbols of different electrical components and the use of various electrical instruments in the laboratory.

CO2 Demonstrate the working and operational characteristics of dc motor and dc generator.

CO3 Evaluate the voltage, current, power and power factor of choke coil and study BH curve of a ferromagnetic core.

CO4 Measure armature and field resistance of DC machines, earth resistance and insulation resistance and demonstrate the internal structure of different machines.

CO5 Analyze the connection and calibration of single phase energy meter

Course Articulation Matrix

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

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) -: No Correlation

Program Articulation Matrix row for this Course

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Course	3	3	2	1	3	2	1	1	3	3	1	1

23ES1202 BASIC ELECTRONICS LAB. (0-0-3)

SESSIONAL OBJECTIVE:

1. To provide engineering skills for circuit design on breadboard with electronic components.
2. To impart the knowledge on digital fundamentals and digital circuit design.
3. To analyze various electronic circuits such as BJT, FET, OP-AMPs etc.

Experiment No.

1. Familiarity with electronic components and devices(Testing of semiconductor diode, Transistor, IC Pins connection) Digital Multimeter should be used.
2. Study and use of CRO to view waveforms and measure its Amplitude and Frequency.
3. V-I Characteristics of a Semiconductor Diode
4. V-I (Output) Characteristics of N-P-N/P-N-P Transistor in CE Configuration
5. Measurement of pinch off voltage and plot transfer characteristics and drain characteristics of JFET.

6. Transfer characteristics and drain characteristics of MOSFET.
7. OP-AMP: Inverting and Non-Inverting Configuration. Record of Waveforms.
8. Verification of Truth table of Logic gates (AND, OR,NOT, NAND, NOR, EX-OR)
9. Half Wave and Full Wave Rectifier without Capacitor filter. Record of Waveforms, Measurement of Average and RMS value.
10. Implementation of digital circuit using Universal gates.

SUPPLEMENTARY BOOKS

1. Integrated Electronics, Millman and Halkias, TMH Publications.
2. Electronic Devices & Circuit Theory, R.L Boylestad and L. Nashelsky, Pearson Education.

SESSIONAL OUTCOME

After completion of the sessional student should be able to

1. Acquire basic knowledge on electronic devices and components
2. Design different electronics circuits using semiconductor diodes.
3. Analyze and develop the characteristics of BJT and FET Circuits
4. Implement Operational amplifier circuits.
5. Acquire knowledge on basic digital logic gates.

23ES1203 PROGRAMMING LAB. (0-0-3)

Experiment Details

Sl.No	Expt No.	Experiment Details
1	1	Write a program to print your Bio-data.
	2	Write a program in C to test the arithmetic operators.
	3	Write a program to find out the simple interest and compound interest with the given input data.
2	1	Write a program to test the logical, bitwise, unary and ternary operators with the given input data.
	2	Write a program to check an inputted year is leap year or not.
	3	Write a program to calculate the salary of an employee given his basic pay, DA, HRA and TA. Display the output in format of salary statement.
3	1	Write a program to enter the marks of a student in 4 subjects. Then calculate the total, Aggregate %, and display the grades obtained by the student.
	2	Write a program to enter a number from 1-7 and display the corresponding day of the week using switch case statement.
	3	Write a program using switch case that read 4 nos. and display a menu thatoffers 4 options: calculate total, calculate average, display the smallest, and the largest number.
4	1	Write a program to check a given number is palindrome or not.
	2	Write a program to generate prime numbers present between two given numbers.
	3	Write a program to print the following pyramid star pattern.

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5	1	Write a program that will accept an array, and find the largest number, smallest number, sum of the elements and average of the elements present in the array.
	2	Write program that will accept an array and sort the array in ascending order. Display both the unsorted and unsorted arrays.
	3	Write a program that will insert an element at a desired position of an array. Show the array before insertion and after insertion of the new element (Array, element and position will provided by the user)
6	1	Write a program to swap the value of two inputted variable using function. Show the initial value and value after swapping.
	2	Write a program to print the Fibonacci series using function.
	3	Write a program that will accept two matrices using function and multiply them using function and show the result using function.
7	1	Write a program to find the GCD among two given number using recursion.
	2	Write a program to accept student data in a structure and display the structure elements.
	3	Check a inputted string is palindrome or not using pointer.
8	1	Write a program to read and print an array of n numbers, then find out the smallest number and its position in the array. Perform all these operations using pointer and function.
	2	Write a program to implement realloc() and free().
	3	Declare a pointer; allocate a block of memory to it using Dynamic Memory Allocation. Input a set of integers to the allocated memory block. The display the set of numbers.
9	1	Write a program to implement insertion and deletion of an element using linked list.
	2	Write a program to implement Push and Pop operations in Stack.
	3	Write a program to implement insert and delete operations in Queue.
10	1	Write a program to implement Quick Sort algorithm using C.
	2	Write a program to search an element using Linear Search algorithm.
	3	Write a program to search an element using Binary Search algorithm.

23ES1204 COMMUNICATIVE ENGLISH & REPORT WRITING LAB.

Course Objective:

The purpose of the English lab is to involve students to actively participate in language learning exercises and get more practice than the traditional classroom environment. The primary role of the lab is to create an environment where students feel comfortable speaking the language theyare learning, and where they can get the help they need in their journey to learn English as asecond language. The lab further focuses

1. To provide a platform to the students to develop their language skills.
2. To strengthen their professional skills and To improve fluency in spoken English, to practice correct pronunciation and neutralize their mother tongue influence.
3. To provide hands-on training in Speaking, Listening, reading and writing skills.
4. To improve the fluency of students in spoken English and neutralize their mother tongue influence.

Assignment I	Self- introduction
Assignment II	Professional presentation

Assignment III	Power point presentation
Assignment IV	Situational conversational practice/ Role play
Assignment V	Review of a book/newspaper editorial/ movie
Assignment VI	Cover letter and CV writing
Assignment VII	Listening Practice
Assignment VIII	Group Discussion
Assignment IX	Mock Interview
Assignment X	Reading Practice

Course Outcome:

At the end of this course students will demonstrate the ability to

CO1: To acquire strategic competence to use both spoken and written language in a wide communication strategies. range of

CO2: To maintain good linguistic competence- through accuracy in grammar, pronunciation and vocabulary.

CO3: Speak English with proper pronunciation and intonation

CO4: Make effective oral presentations by interpreting and analysing data, pictures and videos and participate in Group Discussion on general topics

23ES1205 ENGINEERING GRAPHICS AND DESIGN LAB. (0-0-3)
(with AutoCAD)

1. Introduction to AutoCAD: Basic commands, Code provision of IS-696 regarding Lines, Lettering and Dimensioning.
2. Drawing of Scales (Plane Scales, Diagonal Scales, Vernier Scales and Scales of Chords).
3. Construction of simple geometrical figures and Engineering curves.
4. Orthographic Projections:
   - i) Projection of a point situated in various quadrants.
   - ii) Projections of straight lines.
   - iii) Projection of plane figures.
   - iv) Projection of simple solids.
   - v) Section of solid and Development of surfaces.
5. Isometric projection and perspective view.

Essential Reading:

1. N. D. Bhatt, Geometrical Drawing, Charotar Book Stall, 2002.

Supplementary Reading:

1. K. Venugopal, Engineering Drawing and Graphics + AutoCAD, New Age International (P) Limited. 4th Reprint: June, 2008.
2. K. L. Narayana and P. Kannaiah, Engineering Graphics, Tata McGraw Hill Publishing Co. Ltd.
3. J. D. Bethune, Engineering Graphics with AutoCAD, Pearson Education.

23ES1206 Workshop and Digital Manufacturing Laboratory (0-0-3)

1. Preparation of job in fitting section/Study of lathe and turning operation
2. Preparation of job in black smith section/ Study of milling machine and milling operation.

3. Preparation of job in carpentry section/milling operation on CNC milling machine.
4. Study of CNC lathe machine and turning on CNC lathe.
5. Study of Robot (Pick and place and palletizing operation).
6. Study of additive manufacturing using 3D printer and product development.

1. Carpentry Section: Study of different Hand tools, measuring instruments and equipments used in Carpentry work. Safety precautions.

Preparation of Job: Carpentry job involving different types of joint.

Includes the operations: Measuring, Marking, Sawing, Planing, Chiseling, Mortesing, Tenoning, making Half-lap joint, Mortese & Tenon joint and Nail joint.

2. Fitting Section: Study of different Hand tools, measuring instruments and equipments used in Fitting work.

Safety precautions. Study of Drilling Machine and Grinding Machine.

Preparation of Job: Paper Wt. / Square or Rectangular joint (male-female joint) (any one)

Includes the operations: Measuring, Marking, Filing, Sawing, Drilling, Tapping, Dieing and Punching.

3. Black Smith Section:Study of different Hand tools, equipments and Open hearth furnace used in Blacksmith work. Different types of heat treatment processes. Safety precautions.

Preparation of Job: Weeding hook/ Chisel (any one)

Includes the operations: Measuring, Marking, Cutting, Upsetting, Drawing down, Bending, Fullering and Quenching.

4. Turning/ Milling Section(Conventional & CNC)
   A. Study of Lathe Machine, different parts of Lathe and different applications of Lathe. Study of different measuring & marking instruments.
   B. Study of Milling Machine, different parts and applications of Milling Machine. Study of different measuring & marking instruments.
   C. (i) Study of CNC Lathe Machine, different parts of CNC Lathe and its operation.
      (ii) Part programming for turning operations.
   D. (i) Study of CNC Milling Machine, different parts of CNC Milling Machine and its operation.
      (ii) Part programming for milling operations.
5. Robotics Lab:
   A. Study of Robot.
   B. Pick and place operation, demonstration and explanation of code.
   C. Palletizing operation, demonstration and explanation of code.
6. Additive Lab
   Study of 3D Printer and demonstration of its operation.

Course Outcomes: At the end of the course, the student will be able to:

CO1 Acquire knowledge of conventional & CNC (Lathe and Milling Machine). CNC code and part programming for Milling and Turning operations. Different types of hand tool, measuring instruments and machine tools used in Fitting, Carpentry & Smithy work.

CO2 Know about different types of operations and joints performed in different shops i.e. in Fitting and Carpentry.

CO3 Explore learning about forging temperature of different types of ferrous metals and different types of operation (e.g. upsetting, edging, flattening and bending etc.) carried out on hot metals to prepare jobs.

CO4 Acquire knowledge for the preparation of different types of jobs by using conventional/CNC Lathe and Milling Machines (e.g. facing, step turning, knurling, drilling, boring, taper turning, thread cutting and different methods of indexing for machining gears.

CO5 Acquire skills in using different precision measuring and marking instruments. Understand the importance of safety precaution in different shops.

Course Articulation Matrix

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

23BS1004 MATHEMATICS - II (3-0-0)

Course Objective

The objective of this course is to familiarize the prospective engineers with techniques in ODE, PDE and Fourier analysis. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

Module-I (8 Hrs)

First order ODE :

Exact ODEs. Integrating factors. Linear first order ODEs. Nonlinear first order ODE and Bernoulli's equations, Applications to Population growth, Newton's law of cooling, RL circuit.

Module-II (8 Hrs)

Second order ODE :

Second order linear differential equations with constant coefficients, Euler-Cauchy equations, method of undetermined coefficients, solution by variation of parameters. Power series solutions of ODE. Legendre's equations (explicit solution only).

Module- III (8 Hrs)

Vector Calculus :

Vector and Scalar Functions and Fields, Derivatives, Gradient of a Scalar Field, Directional Derivative, Divergence of a Vector Field, Curl of a Vector Field, Line Integrals, Path Independence of Line Integrals, Double Integrals, Green's Theorem in the Plane (Statement and applications)

Module- IV (8 Hrs)

Complex Analysis :

Limit, Continuity, Derivative, Analytic Function, Cauchy-Riemann Equations, Laplace's Equation, Exponential Function, Trigonometric and logarithm functions.

Module- V (8 Hrs)

Complex Analysis :

Line Integral in the Complex Plane, Cauchy's Integral Theorem, Cauchy's Integral Formula, Derivatives of Analytic Functions, Laurent series, Residue theorem with simple problems.

Essential Reading:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2006.

Supplementary Reading:

1. E.M. Stein, Fourier Analysis: An Introduction (Princeton Lectures in Analysis)
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. S. L. Ross, Differential Equations, 3rd Edition, Wiley India, 1984.
4. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

Course Outcomes:

CO1: The effective mathematical tools for the solutions of differential equations that model physical processes.
CO2: Apply differential equation in real life engineering problems.
CO3: Application of modeling in differential equation.
CO4: To know about complex functions.
CO5: To familiar with application of complex integration.

SYLLABUS

FOR

FIRST YEAR

MBA PROGRAMME

(Effective from 2024-25)

2024-25

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA

ROURKELA

COURSE STRUCTURE

FIRST SEMESTER

Category	Subject Code	Subject	L-T-P	Credit	University Marks	Internal Marks
THEORY						
1. PC	MBPC1001	Management Principles & Organizational Behaviour (MPOB)	3-0-0	3	100	50
2. PC	MBPC1002	Marketing Management	3-0-0	3	100	50
3. PC	MBPC1003	Financial Accounting and Analysis	3-0-0	3	100	50
4. EV	MBEV1001	Managerial Economics	3-0-0	3	100	50
5. QT	MBQT1001	Quantitative Techniques	3-0-0	3	100	50
6. EV	MBEV1002	Business Communication	3-0-0	3	100	50
7. EV	MBEV1003	Universal Human Values, Ethics and Environment	3-0-0	3	100	50
8. EV	MBEV1004	Entrepreneurship & Legal environment	3-0-0	3	100	50
9. EV	MBEV1005	Management Lessons from Ancient India	2-0-0	2	100	50
	Total		**26-0-0**	**26**	**900**	**450**
SESSIONAL / PRACTICAL						
10. PC	MBPC1201	IT Skills for Managers	0-0-2	2	-	100
11. EV	MBEV1201	Business Communication Lab	0-0-1	1	-	100
		Total	**26-0-3**	**03**	**-**	**200**
		Total Semester		**29**	**900**	**650**
		Grand Total (Theory + Practical) = 1550				

SECOND SEMESTER

Category	Subject Code	Subject	L-T-P	Credit	University Marks	Internal Marks
THEORY						
1. PC	MBPC1004	Corporate Finance	3-0-0	3	100	50
2. PC	MBPC1005	Cost and Management Accounting	3-0-0	3	100	50
3. PC	MBPC1006	Human Resources Management	3-0-0	3	100	50
4. QT	MBQT1002	Business Research	3-0-0	3	100	50
5. PC	MBPC1007	Operations Management	3-0-0	3	100	50
6. PC	MBPC1008	Business Analytics	3-0-0	3	100	50
7. PC	MBPC1009	Management Information System	3-0-0	3	100	50
8. PC	MBPC1010	Strategic Management	3-0-0	3	100	50
9. PC	MBPC1011	Introduction to AI	2-0-0	2	100	50
	Total		**26-0-0**	**26**	**900**	**450**
SESSIONAL / PRACTICAL						
10. EV	MBEV1202	Health & Wellness	0-0-1	1	-	100
		Total	**26-0-1**	**01**	**-**	**100**
		Total Semester		**27**	**900**	**550**
		Grand Total (Theory + Practical) = 1450				

MBEV1001 MANAGERIAL ECONOMICS (3-0-0)

Course Objectives:

1. To lay an adequate theoretical foundation to study various applied fields in economics and management.
2. To demonstrate the application of economic theory to business decisions.
3. To develop a student's ability to think analytically about the economic forces at work in society.
4. To develop a framework which the students may use to analyze the overall behavior of a modern mixed economy.

Module – I

Relevance of economics for business decisions,Scope of Managerial Economics, Role of Managerial Economist and Business decision making. Demand Analysis – individual demand and market demand, Determinants of demand, Elasticity of demand and its measures in business decision making, Demand Estimation and demand Forecasting, Supply Analysis.

Module – II

Production functions: Short Run Production Function – Variable Proportions, Long Run Production Function - Returns to Scale; cost minimization and output maximization, various cost concepts, cost functions, Economies of scale and economies of scope (simple numerical problems to be solved).

Module-III

Market morphology, price and output determination under different market conditions: Perfect competition, monopoly, monopolistic competition, oligopoly, Descriptive pricing approaches: Full cost pricing, product pricing; Price skimming, penetration pricing. Input pricing; Concepts of consumption, saving, and investment, Phases of business cycle, Inflation, Fiscal and Monetary policies, National Income.

Course Outcomes:

CO-1: Adopt the managerial economics concepts for business decision making. Also know the law of demand, its exceptions and the use of different forecasting methods for predicting demand for various products and services.

CO-2: Analyse the different costs of production and how they affect short and long run decision. Derive the equilibrium conditions for cost minimization and profit maximization. Analyse economies of scale, diseconomies of scale and economies of scope.

CO-3: Learn about the short run and long run equilibrium of a firm and industry and also about different market structure and various pricing techniques.

CO-4: Analyse different phases of business cycle, Analyse the impact of cyclical fluctuation on the growth of business and lay policies to control business cycle.

Reference Books:

1. Managerial Economics, Geetika, Ghosh, Raychoudhury,TMH
2. Managerial Economics, Salvatre, Srivastava,Oxford
3. Managerial Economics, Keat, Young, Banerjee,Pearson,
4. Managerial Economics, H L Ahuja, S.Chand
5. Managerial Economics Theory and Applications, DM MithaniHPH

6. Managerial Economics, PL Mehta Sultanchand&Co.
7. Managerial Economics, DN. Dwivedi,Vikash

MBEV1002 BUSINESS COMMUNICATION (3-0-0)

Course Objectives:
The objectives of the course are:

1. To provide an overview of the process and types of communication including Business Communication
2. To familiarize the learners with different formats of organizational communication
3. To infuse the correct practices and strategies of effective business writing and business presentation.
4. To put in use the basic mechanics of grammar, usage, and punctuation.
5. To create awareness of employability skills.

MODULE-1: ORAL COMMUNICATION

Communication Basics: The process of communication (2-way Model): Sender, Message, Channel, Receiver, and Feedback. Barriers to Communication, Communication Flow in Organizations: The Grape-vine; Formal Channels- Downward, Upward; Horizontal; Diagonal. Non-verbal Communication: Kinesics, Oculesics, Proxemics, Chronemics, Haptics, Paralanguage, Appearance and Artifacts.

Language Skill 1 - Listening: Listening Vs. Hearing- Importance of the listening Skill- Types of Listening: Active Listening; Empathetic Listening; Content Listening; Critical Listening- Guidelines for improving the Listening skill.

Language Skill 2- Speaking: Guidelines for improving confidence, fluency, articulation, accent and voice modulation while speaking, Cell Phone Etiquette; Meetings: Preparing a Notice- cum- Agenda; Chairperson's role; Other role functions in a meeting; Minutes of a meeting.

MODULE-II: WRITTEN COMMUNICATION

Language Skill 3 – Reading: The Process of Reading; Sub skills of Skimming, scanning, inferring, guessing word-meaning, Using appropriate speed for various kinds of reading, correction of reading faults of eye-fixation, regression, finger-pointing, sub-vocalizing, Reading aloud, and indiscriminate use of the Dictionary. Critical Reading with analytical skills.

Language Skill 4- Writing: The Writing Process- Guidelines for composing effective business messages- Persuasive Techniques: Fundamentals of Persuasion, Components of Attitude - Cognitive, Affective, Behavioural (Ethos, Pathos, Logos & Syllogism) - AIDA - NLP (VAKOG), Appeals (Emotional & Rational).

Business Letter: Form; Formats; and Types: Structure of Routine and persuasive business messages, good-will, good-news, and bad-news messages.

Business Memo; Features of an effective business E-mail; Rules of Netiquette.
Preparing a Resume- Parts of a Resume- Resume Styles: Chronological, Functional, and Chrono- Functional- Resume Design- Job Application letter.

Writing Business Reports: Features of a good business report. Formats- Printed form, Memo, Letter, manuscript; Structure of a short Formal Report. Steps in planning and preparing a business report.

Writing a Case Analysis
Applied English Grammarfor Business Writing: English Verb types: Stative and Dynamic; Transitive and Intransitive; Main and Auxiliary verbs. Tenses- Subject Verb Concord- Active & Passive voice- Relative Clauses & Modifier Placement-Parallel Structures- Punctuation.

MODULE-III: EMPLOYABILITY SKILLS
Group Discussion: Difference between GD and Debate- Parameters of Performance evaluation in a GD: Awareness, Reasoning ability, Discussion Skills, Leadership, Openness, Assertiveness, Attentive Listening, Motivation and Enthusiasm- How to get prepared for GD- Some Dos and Don'ts.

Interviews: Types by purpose; 3 stages of an interview; how to prepare for an interview; how to answer FAQs; Following up with a letter of thanks.

Presentations: Their importance for a manager- Features of a good business presentation. Planning, Preparing & Structuring a PPT Preparation, Rehearsal & Delivery- Answering questions after the presentation- Overcoming stage fright- Importance of Body Language in presentations.

Communication in Global Environment:
Cross cultural communication
Technology in use - Video conferencing - Google Meet - Teams – Zoom: Arranging meetings
Social Media - Artificial Intelligence & Communication prompts.

Course Outcomes:
After the course, the students will be able to:
CO-1: Distinguish among various levels of organizational communication and communication barriers while developing an understanding of communication as an organizational process.
CO-2: Develop awareness of Techniques of active Listening and fluent speaking.
CO-3: Apply the reading strategies of Skimming, Scanning, and Inferring in the comprehension of the reading texts of various types.
CO-4: Demonstrate the ability to compose reasonably error-free business correspondence with brevity and clarity.
CO-5: Apply Creative thinking as well as critical thinking in preparing his/her resume, in writing Reports, and in taking part in Group Discussions, and in designing PPTs for presentation.
CO-6: Use appropriate communication skills in multicultural contexts, in social media, in web meetings, and in web browsing.

Text Books:
1. Communication Skills. Sanjaya Kumar & Pushpa lata, Oxford University Press.
2. Business Communication: Skills, Concepts, and Application- P.D Chaturvedi and Mukesh Chaturvedi, Pearson.
3. Business communication- Meenakhi Raman & Prakash Singh, OUP.

4. Business and Managerial Communication- Sailesh Sengupta, PHI learning
5. Bcom: Business Communication- A South Asian Perspective, Lehman, Dufrene & Sinha, Cengage Learning.
6. Effective Technical Communication, Ashraf Rizvi, McGraw Hill India.

MBEV1003 UNIVERSAL HUMAN VALUES, ETHICS AND ENVIRONMENT (3-0-0)

Course Objectives:

1. To develop students' understanding of the concept of Human Values and related issues.
2. To make students aware the importance of Harmony in self, family, society and nature.
3. To make the students understand the importance of ethical practices in business and governance.
4. To exhibit understanding of the importance of business environment and probable impact of environmental factors on a business.
5. To sensitize learner the link between environmental issues and business.

Module I- Universal Human Values (UHV)

Universal Human Values (UHV)– Introduction, Need for Value Education, Right Understanding, Mutual happiness and prosperity, Role of Education-Sanskar (Enabling the Transformation to Human Consciousness), Self-exploration- The Content and Process, Meaning of Happiness and Prosperity. Understanding Harmony in the Self-Harmony of the Self with the Body: Self-regulation and Health, Understanding Harmony in the Family -Feeling of Relationship as the Basis for Harmony in the Family, 'Trust' – the Foundational Value in Relationship, Respect– As the Right path to harmony in family, Affection, Care, Guidance, Reverence, Gratitude and Love as Values in Relationship.Understanding Harmony in the Society - Understanding Human Goal, Harmony from Family Order to World Family Order –Universal Human Order- From understanding self to Family order, Family cluster order, village cluster order, Nation order, and world family order.Understanding Harmony in Nature/Existence: Nature as Collection of Units: Harmony among the Four Orders- Physical order, Bio order, Animal order, and Human order. Mutual fulfilment among the Four Orders of Nature: Co-existence at all Levels. The Holistic perception of Harmony in Existence.

Case Study depicting business applications of Universal Human Values (UHV)

Module II- Business Ethics

Ethics& Business Ethics - Definition, Meaning, Importance, Nature & Scope. Factors influencing business ethics, Salient feature, Ethical principles in business. Theories of ethics-Absolutism vs. Relativism, Kohlberg stages of moral development. Managing ethical dilemmas, Ethical decision making, Employee and Business Ethics, Ethical and value-based leadership. Ethics in governance practices in corporates, Corporate scams and unethical practices. Ethical principles and practices in Marketing, Finance, HRand other disciplines. Promoting ethical culture in business organization.

Case Study depicting ethics in business to be discussed.

Module III- Environment

Natural environment; Ecology and environmental protection and sustainable development – Bio-diversity and environmental degradation issues, Managing natural disaster,

Environmental Legislations, Issues of global warming, terrorism, natural disasters. Issues relating pollution- causes, and control measures.Greening Management- Green policies and practices in corporates, Environmental Partnership, Environment Audit, Product Stewardship. Environment Management as Competitive Advantage, World Business Council for Sustainable Development (WBCSD) and its ten messages for business.

Business Environment: Meaning, nature and scope, economic and non-economic environment; internal and external environmental factors. Scanning of environment-methods and techniques of scanning (ETOP, SWOT).Economic Environment of Business: recent developments in Indian Economy. Non–Economic Environmental Factors: Non-Economic factors influencing business. Changes in Business and Industrial policy- Recent industrial policy, trade liberalization, from a Closed to Open economy.
Case Study depicting Business Environment.

Course Outcomes:

CO-1: Develop a comprehensive understanding of Universal Human Values (UHV) and their practical applications in personal, familial, societal, and business contexts.
CO-2: Analyze ethical principles and theories in business decision-making, fostering a culture of integrity, responsibility, and leadership.
CO-3: Evaluate environmental issues, regulations, and sustainable business practices to mitigate ecological degradation and promote corporate responsibility.
CO-4: Assess the dynamic business environment, including economic, political, and ethical dimensions, to navigate challenges and opportunities in diverse socio-economic landscapes.

Text Book(s)

1. A Foundation Course in Human Values and Professional Ethics by R R Gaur, R Asthana, G P Bagaria,Excel Books, New Delhi, 3rd Edition.
2. A Foundation Course in Holistic Human Health by S Asthana, A Shukla, TS Perumal- UHV Publication.
3. Business Environment – B N Ghosh, Oxford
4. Business Ethics – Murthy, HPH
5. K.S.Thakur, Business,Ethics and Environment, Publisher: Aadi Publications, Seller: Neha Publisher

Reference Books

1. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain
2. A N Tripathy, 2003, Human Values, New Age International Publishers.

MBEV1004 ENTREPRENEURSHIP & LEGAL ENVIRONMENT (3-0-0)

Course objectives:

1. The aim of learning by putting business and law together is to Create and maintain functional skill spaces on spectrum of lawful insight for Learners whether they run business entities or work for the people running it.
2. Sensitize the students to understand entrepreneurship as a career and skills required.

Module- I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneurs, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurship as a career,Identification of opportunity and converting idea to reality, Role of family, Society, EDIs. Sickness of Small-Scale Industries, Causes and symptoms of sickness, cures of sickness, Role of Banks and Governments in reviving industries.

Start-up Environment: Definition and characteristics of start-ups, Types of start-ups (Social, impact based, rural start-ups), Start-up India policy, Start-up Odisha policy, Knowledge of Key Accelerators, Incubators and Mentors in India, Understanding their role and advantages and disadvantages.

Module-II

Law of Contract: Contract Act: Indian Contract Act, 1872, Agreement, Contract, Essentials of Contract (Offer & Acceptance, Consideration, Capacity of Parties, Free Consent, and Legality of Object), Performance and Discharge of Contract, Remedies for breach of contract, Quasi Contract and Contingent Contract.

Special Contract: Sale and agreement to sell, Condition and Warranty, Transfer of properties, Finder of Goods, Performance of Contract of sale, Unpaid seller and his rights.

Module-III

Company Laws: Indian Companies Act 2013, Salient features and Classes of Company. Lifting of corporate veil, Procedure of Incorporation and Certificate of commencement of business, Memorandum and Articles of Association, Doctrine of ultra vires and Indoor Management, Management of Company: Qualification, Appointment of Directors, Company Meetings, Resolutions, Winding-up of Companies and their modes.

Course Outcomes:

CO-1: Rationalise for studying Entrepreneurship Development and realizing that entrepreneurs are wealth creators in our society.

CO-2: Demonstrate a fundamental comprehension of business opportunities and implementing them practically.

CO-3: Discuss unique start-up or entrepreneurial ideas in groups and present a business plan that articulates and applies financial, operational, organizational, market, and sales knowledge to identify paths to value creation through 1) company formation (for-profit); 2) social innovation (non-profit); or 3) intellectual property licensing.

CO-4: Demonstrate an in-depth understanding of the Start-up ecosystem in India and become conversant with sources of new finances, use of technology, customer acquisition concepts, etc. The focus will be on creating sustainable businesses.

Text Books:

- Entrepreneurship Development and Management, Vasant Desai, HPH
- Entrepreneurship Management, Bholanath Dutta, Excel Books
- Entrepreneurial Development, Sangeeta Sharma, PHI
- Entrepreneurship Development by Khanka
- Entrepreneurship, Rajeev Roy, Oxford University Press
- Business Law –S R Mohapatra and S R Patra, HPH
- Business Law – N D Kapoor, S Chand
- Business Law – Pathak, Tata Mc Graw Hill

MBEV1005 MANAGEMENT LESSONS FROM ANCIENT INDIA (2-0-0)

Course Objectives:

1. To understand the evolution of management thought in ancient India and its relevance in modern times.
2. To analyse the management perspective present in Vedantic literature, focusing on principles applicable to contemporary management practices.
3. To examine the ethical and moral values, leadership qualities, and strategic management lessons derived from the Ramayana, the Mahabharata and the Bhagavad Gita.
4. To explore the management and economic principles elucidated in Kautilya'sArtha Sastra and the Jain texts.

Module- I

Introduction to Ancient Indian Knowledge System; Evolution of Indian management thought; Need of India oriented Approach.

Management perspective in Vedantic Literature.

Management lessons in the Ramayana: Ethical and moral values, leadership, governance, strategic alliance.

Management lessons in the Mahabharata and the Bhagavat Gita: Conflict management, Inspirational leadership, alternative perspective on work and performance

Module-II

Kautilya's management lessons: Qualities of a leader, functions and role of a leader, motivation and communication; Principles and practice of governance of a state and of a corporation; Economic Thought of Kautilya.

Management perspective in Jain Literature: Code of conduct, Four pillars of human values, Conflict resolution, Ethical management, Mahavira's Economics.

Management Lessons in Buddhist Literature: Team building, Personal development of team members, Knowledge management.

Course Outcomes:

After the course the students will be able to:

CO-1: Demonstrate a deep understanding of the ancient Indian knowledge system, including its philosophical, spiritual, and managerial dimensions, and apply this understanding to contemporary management challenges.

CO-2: Critically analyse the evolution of Indian management thought, recognizing key influencers and schools of thought, and synthesize these insights to develop a holistic approach to management.

CO-3: Evaluate the management perspectives presented in Vedantic, Jain, Buddhist, and epic literature (such as the Ramayana, Mahabharata, and Bhagavad Gita), identifying common themes and principles, and apply them to address complex organizational issues.

CO-4: Develop practical skills in leadership, governance, conflict resolution, ethical management, team building, personal development, and knowledge management, drawing from the rich tapestry of ancient Indian texts and adapting them to modern organizational contexts.

Text Books:

1. Management Practices and Thoughts in Ancient India, Khandelwal and Mohanty, Himalaya Publishing House
2. Relevance of Ramayana in Contemporary Times, Gupta, Agrawal and Sharma, IBA publications
3. Kautilya-The Artha Shastra, L.N. Rangarajan, Penguin books
4. Indian Models of Economy, Business and Management, P. Kanagasabapathi, PHI
5. Sri Bhagavad Gita for Managers, Khandelwal, Himalaya Publishing House.
6. "Indian Management and Leadership: Spiritual and Ethical Values for Corporate and Personal Success" by S. Ramaratnam: BLUEJAY BOOKS- 2007
7. "Indian Economic Development" by Uma Kapila: Academic Foundation; 2018
8. "The Mahabharata: A Modern Rendering" by Ramesh Menon Vol-1 & Vol-2, iuniverse-2006.

"The Bhagavad Gita" (translated by Eknath Easwaran), Nilagir Press, 2007

MBEV1201 BUSINESS COMMUNICATION LAB (0-0-1)

Course Objectives:

The objectives of the course are:

1. To improve LSRW skills.
2. To learn and practice communication skills in a business context.
3. To enhance reading and listening comprehension.

1. Listening exercises:
   - Listening with a focus on pronunciation: segmental sounds, stress, weak forms, intonation.
   - Listening for meaning: listening to a short talk /news bulletin.
   - Taking notes from a lecture/speech.
   - Comprehending conversation
2. Speaking exercises :
   - Giving a short speech on a topic of interest. Participate in debates.
   - Preparing for GDs, Interviews: Structured & Unstructured, Stress Interviews, Business Etiquette
   - Preparing Presentation, Making presentations before the top management.
   - Practice exercises on the common grammatical errors.
   - Role- plays to practice effective use of body language, para language and spatial communication.
3. Reading exercises :
   - Developing vocabulary, Improving reading speed & comprehension
   - Note making after reading a text.
   - Showing the main idea and supporting ideas and the relationship between them.
   - Analyzing news articles.
4. Writing exercises :
   - Practice in writing paragraphs, Précis writing
   - Managerial Writing: Business letters: request, invitation, proposal, sales reports
   - Managerial Writing: Ad copywriting using AIDA, appeals, cognitive dissonance, Preparing Press Releases, Press Notes

- Writing CVs and Resumes, AI Prompts & keywords
- Remedial measures to focus on correct use of English verbs, sentence structures, clause- types, Interrogation and parallel structures.

Course Outcomes:

CO-1: Create Documents
CO-2: Develop group communication skills.
CO-3: Demonstrate business etiquette.
CO-4: Demonstrate presentation skills.
CO-5: Understand and evaluate self to develop Emotional Intelligence
CO-6: Develop interviewing and responding skills.

Text Books:

1. English Language Laboratories, Nira Konar, PHI
2. Guide to Managerial Communication, Mary Munter, Pearson
3. Cengage Learning India, English Language Communication Skill – Lab Manual
4. Soft Skills for Everyone, Butterfield, Cengage
5. Campus to corporates, Sage Publication
6. A practical Course in Spoken English, Gangal, PHI

MBEV1202 HEALTH & WELLNESS (0-0-1)

Course Objectives:

1. To understand the importance of nutrition in preventing life-threatening diseases like cancer, hypertension, obesity, diabetes, and cardiovascular diseases.
2. To explore the components of physical fitness and differentiate between active and sedentary lifestyles, understanding their implications on health.
3. To examine the relevance of promoting holistic well-being in the modern world.
4. To learn various yogasanas, Pranayama, and meditation techniques for fostering a healthy mind-body connection and overall wellness.

Module-I: Introduction to Health & Wellness

Definition of health- WHO definition, definition as per Ayurveda; Importance of health in everyday life; Components of health- physical, social, mental, spiritual and its relevance; Concept of wellness: Mental Health & wellness; Mind- Body connection in health, concept and relation Implications of mind-body connections.

Module-II: Management of Health and Wellness

Stress Management and Relaxation Techniques: Understanding stress and its impact on health, Stress management strategies, Relaxation techniques, including yoga and meditation. Need and importance of yoga (Asanas and Pranayama), and meditation for healthy well-being.Preventive Healthcare and Disease Prevention: Role of preventive healthcare measures, Screening tests and immunizations, Lifestyle factors in disease prevention.

Course Outcomes:

CO-1: To understand the concept of health and wellness and its relevance in daily life.
CO-2: To be aware of the relation between mind-body and its relevance.
CO-3: To adopt healthy physical habits and behaviours for well-being.

Books:

1. A Text Book on Physical Education & Health Education Fitness, Wellness and Nutrition, Dr. A. K. Uppal, Dr. P. P. Ranganathan.
2. Dr. R. Nagarathna and Dr. H.R. Nagendra: Yoga and Health, Swami Vivekananda Yoga Prakashana,2002
3. B. C. Rai Health Education and Hygiene, Published by Prakashana Kendra, Lucknow.

MBPC1001 MANAGEMENT PRINCIPLES & ORGANIZATIONAL BEHAVIOUR (MPOB) (3-0-0)

Course Objectives:

1. To introduce the students with the fundamentals of management and its processes.
2. To facilitate the students in understanding individual, group behavior and organizational culture and climate impacting learning organisation.

Module-I: Foundations of Management

Introduction to Management and Administration, Evolution of Management, Management Levels; Managerial Roles and Skills; Management Functions: Planning,Organising,Staffing, Directing and Controlling, Management Process, Decision Making, Contribution in the filed of Management by Peter F. Drucker, Michel Porter, C.K. Prahalad, Barnand, McGregor, Rensis Likert and McKinsey.

Module-II: Organisational Behaviour- I

Introduction to Organization Behaviour, Nature, Scope, OB Model, Personality: Traits and types; Perception-Factors and Process, Employee Motivation - Values and attitude; Barriers to change attitude, Developing Emotional Intelligence at the work place, Interpersonal relation and Transactional Analysis.

Module-III: Organizational Behaviour- II

Group and Team- stages and effectiveness; Conflict Management process, Leadership-skills, roles, Styles (Managerial Grid), Women leadership in India.

Organizational culture, Organizational climate VS organization culture, Factors contributing towards creating and sustaining culture,Organization Design, Change Management- Change Model and Organizational Development, Learning organisation-Organizing Knowledge Resource.

Course Outcomes:

After completing this course, students should be able to:

CO-1: Define, remember, understand, explain and interpret various concept of Management and organizational behaviour, managerial levels, roles, and skills managerial functions. such as Planning,Organising,Staffing, Directing and Controlling.

CO-2: Analyse and identify various aspects of individual organizational behaviour such as personality, perception, values, attitude, motivation and their impacts.

CO-3: Evaluate group and team dynamics, including stages of development and factors influencing effectiveness, and assess leadership skills, roles, and styles, including the Managerial Grid and the role of leadership in organizational context.

CO-4: Integrate and implement important managerial and behavioural skills to empower the students to appreciate the requirement of behavioural code of conduct in the world of business.

Text Book:

1. Management, Stephen P. Robbins, Mary Coulter, Agna Fernandez, Pearson Education, 2018
2. Organizational Behavior, Fred Luthans, McGraw Hill, 2017 References:
3. Organizational Behaviour: Human Behaviour at Work, – John W. Newstrom, Tata McGraw Hill,2017
4. Organizational Behaviour –Text and cases by Aswathappa, 12th revised edition, Himalaya publication
5. Essentials of Management, Harold Koontz, Heinz Weihrich ,Mark V Cannice,2020
6. Behavior in Organizations, Jerald Green Berg & Robert A. Baron, Pearson Education,2010 5. Management and Organizational Behaviour, Subbarao P, Himalaya Publishing House,2017 6. Organizational Behaviour, Sarma, Jaico Publications,2009
7. Management and Organizational Behaviour, Paul Hersey and Ken Blanchard, PHI,2009
8. Organizational Behavior, Kavita Singh, Pearson 2010

Mode of Evaluation: Assignments, Quiz, Mid Term Tests, End Semester Examination

MBPC1002 MARKETING MANAGEMENT (3-0-0)

Objectives:

1. Understand the fundamental concepts and principles of marketing, including the distinction between selling and marketing, the marketing concept, and the significance of avoiding marketing myopia.
2. Analyze the marketing environment, distinguishing between macro and micro factors, and evaluate the importance of environmental analysis in strategic decision-making.
3. Develop proficiency in market segmentation, targeting, and positioning strategies, along with an appreciation for the role of consumer behavior in shaping marketing strategies.
4. Gain practical knowledge of product management, pricing strategies, distribution channels, and promotional techniques, including contemporary approaches such as digital marketing, relationship marketing, and green marketing.

Module-I

Definition & Functions of Marketing, Scope of Marketing, Marketing concept, Selling versus Marketing, Concept of Marketing Myopia. 80: 20 Principle, Introduction to the Concept of Marketing Mix, Bottom of the pyramid concept; Concept of Marketing Environment: Macro and Micro, Need for analyzing the Marketing Environment.

Module-II

Market segmentation, Bases for market segmentation, Targeting , Positioning; Meaning & importance of consumer behavior, Comparison between Organizational Buying behavior and consumer buying behavior, Buying roles, Five steps buyer decision process.
Contemporary Topics: Viral Marketing, Guerrilla Marketing, Societal and social Marketing, Relationship Marketing, Green Marketing , Digital Marketing, Network Marketing (Concepts only)

Module-III

Product: Classification of consumer products and industrial products, Product Mix,

NewProduct Development Process: Idea Generation to commercialization. Product Life Cycle, Strategies across stages of the PLC.Packaging&Labeling, Basicconceptof Branding Pricing Basics: Meaning, Importance of pricing, Factors Influencing pricing decisions., Pricing strategies andapproaches

Place: The Role of Marketing Channels: Channel functions & flows, channel levels. Channel conflicts and resolution (Overview only)Channel Options: Introduction to Wholesaling, Retailing, Franchising, Direct marketing, E- Commerce Marketing Practices.

Promotion: The role of marketing communications, Elements of promotion mix, IMC approach (Overview)

Course Outcomes:

CO-1: Identify the key analytical frameworks and tools used in marketing.
CO-2: Utilize the information of a firm's external and internal marketing environment to identify and prioritise appropriate marketing strategies.
CO-3: Examine the marketing function and the role it plays in achieving organisational success both in commercial and non-commercial settings
CO-4: Analyse 4 Ps of marketing and its application across industries.

Books:

- Marketing:Baines,FillandPage,Sinha,Oxford
- MarketingManagement–Kotler,Keller,Koshy, Jha,Pearson,
- MarketingbyLambHair Sharma,McDanielCengage Learning
- MarketingManagement,Ramaswamy&Namakumari,McGrawHill
- MarketingManagement–KKarunakaran,Himalaya PublishingHouse
- MarketingManagement–TextandCases,TapanKPanda,ExcelBooks
- MarketingManagement–J.PMahajan, Vikas
- MarketingManagement-Rudani,S Chand

MBPC1003 FINANCIAL ACCOUNTING AND ANALYSIS (3-0-0)

Course Objectives:

1. To familiarize the students with accounting principles and acquaint them with accounting mechanisms, process and systems so as to develop their skills of preparing financial statements.
2. To develop their ability to read annual reports and develop their skills to interpret financial statements.
3. To familiarize the students with different financial accounting concepts affecting stakeholders.

Module-I:

Introduction to Accounting: Accounting as a language and need for Accounting, Basic Terminologies of Accounting. External and Internal users of Accounting Information, Accounting concepts and conventions, Accounting cycle, Accounting Equations, Nature of GAAP, Need for Accounting Standards, Limitations of Accounting, Ethical Issues in Accounting, Mechanics of Accounting: Introduction, Classification, Double Entry System, Preparing Journal, Subsidiary books, Ledger, preparation of Trial Balance.

Module- II:
Preparation of Financial Statements: Income statement and Balance Sheet, Corporate Accounts: Share and Share Capital, Issue of Shares, Payment in installment, Buyback of shares, Debentures and Bonds, understanding Corporate Income statement and Balance Sheet as presented in the Annual Reports of companies.

Module-III:
Financial Statement Analysis: Analysis and interpretation of Financing Statements, Common size statement, Comparative statement analysis, Trend analysis, Ratio Analysis, Cash Flow Analysis as per IND AS 7.

Course Outcomes:
CO-1: Explain the role of accounting as a language for financial communication of businesses, and meet the needs of both external and internal users using accounting principles.
CO-2: Illustrate the complete accounting process, including journalizing transactions, posting them to ledger, maintaining subsidiary books, preparing trial balance and drawing the financial statements for sole traders.
CO-3: Demonstrate a comprehensive understanding of corporate accounts, including the concepts of shares, share capital, the issuance of shares, instalment payments, share buybacks, and the use of debentures and bonds in corporate financing.
CO-4: Analyse corporate financial statements using techniques like Common Size Statement, Trend Analysis, Ratio Analysis, and Cash Flow Analysis as per IND AS 7.

Text Books:

1. Financial Accounting for Management; Paresh Shah,Oxford
2. Financial Accounting A managerial Perspective-Bapat & Raitha, McGrawHill
3. Financial Accounting for Managers-Sanjay Dhamija,Pearson
4. Accounting for Business Managers- Sakshi Vasudeva,HPH
5. Financial Accounting for Management,A.K.Bhattacharya
6. Financial Accounting for Management,Narayanswamy
7. Financial Accounting by S.N Maheswari VikasPublications
8. Financial Accounting by Satapathy, Mohapatra, Patra,Vrinda

MBPC1004 CORPORATE FINANCE (3-0-0)

Course Objectives:
1. To provide students with concepts, techniques and tools of Financial Management.
2. To study, analyze and improve their knowledge on financial management practices of an organization

Module I:
Foundations of Finance: Nature &Scope. Organization of Financial Functions. Emerging role of FMs in India and in Global context. Financial Goal. Agency problems. Time value of money, Compounding and discounting. Short term and long-term sources of fund.

Module II:
Investment Decisions. Capital Budgeting: Features, types and Techniques of capital budgeting decision. Cost of Capital. Financing Decision: Operating Leverage, Financial

Leverage. Capital structure. Theory and Policy. Dividend Decision Dividend Theory, Dividend Policy.

Module III:
Current Assets Management: Working Capital concepts, Policies, estimation, factors affecting working capital, Sources of financing Working Capital, Management of Cash: Cash budget, Management of collections and disbursement, Investment of Surplus cash; Management of Receivables: Terms of Credit, Credit Policy decision; Management of Inventory: Techniques of Inventory planning and control.

Course Outcomes:
CO-1: Explain the foundational concepts including finance functions, financial goals, agency problems, time value of money, risk and return concepts, and various sources of funds.
CO-2: Interpret the concepts of cost of capital and apply various capital budgeting techniques to evaluate investment proposals.
CO-3: Describe the capital structure and its theories, analyse the impact of leverage on financing decisions, and apply dividend theories for effective dividend policies.
CO-4: Identify strategies for effective current assets management including cash, receivables, and inventory to take working capital decisions.

Text Books:
- Fundamentals of Financial Management, Van Horne,Pearson
- Financial Management, G Sudarsan Reddy, HPH
- Essentials of Financial Management, IM Pandey, Vikas
- Financial Management, Khan & Jain, McGraw Hill,
- Financial Management, Srivastav &Misra, Oxford.
- Financial Management – Tulsian (S Chand)
- Fundamentals of Financial Management, Brigham, Cengage
- Financial Management by Prasanna Chandra , Tata McGraw Hill

MBPC1005 COST AND MANAGEMENT ACCOUNTING (3-0-0)

Course Objectives:
1. To understand the concept Cost accounting & Management Accounting
2. To familiarize the students about various methods of costing followed in different organizations
3. To understand and apply the various marginal costing techniques for managerial decision making

Module-I
Introduction to Cost Accounting and Management Accounting: Basic concepts: Scopes. Types of Cost, Financial Accounting, Cost Accounting and Management Accounting., Methods of Costing, Techniques of Costing, Classification of Costs, Cost Centre, Cost Unit, Profit Centre, Investment Centre, Preparation of Cost Sheet, Total Costs and Unit Costs.

Module-II
Cost Accounting System: Material Cost Management: Material Cost Valuing material issues and stock, Overheads: Meaning and Importance, production overhead, Primary distribution and Secondary distribution, allocation and apportionment of cost. Absorption by production units, Methods, over and under absorption of overhead.

Module-III

Methods and Techniques: Job Costing, Contract costing and Process Costing, Joint Product and By Products. Service Costing: Transport, Hospital, Canteen, Marginal Costing: Nature and Scope, Marginal Cost Equation, Profit Volume Ratio, Break-even Chart, Application of Marginal Costing Techniques for managerial decision making: Make or Buy decision, selection of Suitable product Mix.

Management Tools: Budgetary Control: Functional budgets, Cost budget, Master Budget, Performance budgeting and Zero based budgeting. Flexible budgets. Standard Costing: Standard cost and standard costing, standard costing and budgetary control. Analysis of variances (Material, Labour and Sales), Cost Reduction and Cost Control.

Course Outcomes:

CO-1: Acquire, describe and explain fundamental knowledge of cost accounting concepts and identify the various elements to calculate the total cost and unit cost of a product or service.
CO-2: Evaluate and interpret different methods costing to ascertain and control the costs in manufacturing and service industries.
CO-3: Use costing techniques for short-term decision-making and product cost analysis.
CO-4: Illustrate and utilize advanced management tools for budgeting, standard setting, locating variances and evaluation of performance.

Books

- A text book on Cost and Management Accounting, M.N Arora,Vikas
- Cost and Management Accounting, S P jain, K L Narang, Simmi Agrawal, Kalyani
- Cost and Management Accounting , Colin Drury, Cengage Leaning
- Morden Cost and Management Accounting, M.Hanif, Tata McGraw Hill End Pvt.Ltd

MBPC1006 HUMAN RESOURCES MANAGEMENT (3-0-0)

Course Objectives:

1. To introduce and explain different phenomenon of Human Resource Management (HRM).
2. To enrich the students' understanding on HRM, which may enable them to implement the concepts in theworkplace.

Module I

Concept, Definitions and Objectives of Human Resource Management (HRM); Functions of HRM; Process of HRM; Evolution of HRM; Strategic HRM and its role in the organization; Human Resource Planning (HRP): Meaning and Process, Job analysis: Job description and Job specification; Recruitment: Meaning, Sources, Process and Yield Ratio; Selection: Meaning and Process, Tests and Interviews, Induction andSocialization.

Module II

Performance Appraisal: Meaning, Objective, Process and Methods; Potential Appraisal; Biases in performance appraisal; Methods of job evaluation; Meaning of Compensation; Types of compensation; Types of wages and theories; Wage differentials; Pay structure, Wage Law in India, ExecutiveCompensation.

Module III

Concepts of Career, Career planning process, Career Stages; Training & Development: Concept, Training need analysis and Methods of training (on-the-job and off-the-job training), Evaluation of Training effectiveness; Concepts of Promotion, Transfer and Separation, Organization Citizenship Behaviour, HRIS, Competency mapping, Talent Management, Employee engagement.

Course Outcomes:

CO-1: Explain & interpret different concepts, Functions & Processes of HRM.
CO-2: Apply different tools and techniques for managing human resources in an organization.
CO-3: Analyze, identify problems and develop skill sets in managing human resources in an organizational context.
CO-4: Integrate the knowledge of HR concepts to Plan and design human resource intervention & strategies for an organization.

Text Books:

1. HRM Text &Cases,Aswathappa,TMH.
2. Personnel &Human Resource Management, P.Subba Rao,HPH
3. Human Resource Management – VSP Rao ,Excel
4. Human Resource Management, Jyoti Venkates,Oxford
5. HR, Denisi and Sarkar,Cengage.

MBPC1007 OPERATIONS MANAGEMENT (3-0-0)

Course Objectives:

1. To understand the concepts, principles, problems, and practices of operations management.
2. To understand the importance of an effective operations strategy in an organization.
3. To understand the various production and operations design decisions and how they relate to the overall strategies of organizations.

Module I

Overview of Operations Management and Capacity Planning: Operations in Manufacturing and Services, Responsibility of Operations Manager, Operations Strategy and Competitiveness, Process Analysis, Job Design and Work Measurement; Capacity Planning – Concept, Types of capacity; Aggregate Planning - Relevant cost and strategies.

Module II

Facility Location and Layout, Inventory Management:Facility location - Factors, Techniques (single facility and multi-facility), Factor Rating Method, Centroid Method; Facility Layout – Concept, Types of layouts and Line Balancing, Inventory Management – concept, EOQ, MRP.

Module III

Scheduling, Project Management and Quality Management: Scheduling; Gantt Chart; Project Management – concept and technique PERT and CPM; Quality management – concept, quality design, control chart (X, R, P), TQM, introduction to ISO 9000 ISO14000 (EMS) , ISO 18000 (OHSAS) and ISO 22000.

Course Outcomes:

CO-1: Identify the elements of operations management and various transformation processes to enhance productivity and competitiveness.

CO-2: Analyse and evaluate various facility alternatives and their capacity decisions, develop a balanced line of production & scheduling and sequencing techniques in operation environments.

CO-3: Develop aggregate capacity plans and MPS in operation environments.

CO-4: Plan and implement suitable quality control measures in Quality Circles to TQM.

Text Books:

1. Production and Operations Management, K. Aswathappa, K. S.Bhat,HPH
2. Operations Management, Chase et.al – Tata McGrawHill.
3. Production and Operations Management , Panneerselvam ,PHI
4. Production and Operations Management , S.N Chary , Tata McGrawHill
5. Operations Management, Meenakhi Kumari,Cengage
6. Production and Operations Management, Kaniska Bedi,Oxford
7. Production & Operations Management, SP Singh, VikasPublication
8. Essentials of Operations Management by Scott T Young – SagePublication

MBPC1008 BUSINESS ANALYTICS (3-0-0)

Course Objectives:

1. Provide foundational knowledge of business analytics concepts (descriptive, predictive, and prescriptive) and their application to business decision-making.
2. Develop skills in data management and visualization using tools like R programming and exploratory data analysis (EDA).
3. Introduce advanced predictive analytics techniques, including regression, classification, and time-series forecasting.
4. Highlight real-world business analytics applications in marketing, finance, and supply chain management.

Module-I

Introduction to Business Analytics and its importance, Types of Analytics- Descriptive, Predictive, Prescriptive, Business Analytics Framework and Applications,Data Management and Governance- Data Collection, Cleaning, Integration and Data Warehousing and ETL Processes,Data-Driven Business Models

Module-II

Introduction R Programming, Descriptive Analytics Techniques- Exploratory Data Analysis (EDA),Descriptive Statistical Techniques (e.g., mean, median, mode),Data Visualization and Reporting,Predictive Analytics Techniques-Regression Analysis, Classification Models,Time-Series Forecasting, Clustering.

Module—III

Big Data Analytics Framework and Technologies, Industry Application- Marketing Analytics, Financial Analytics, Supply Chain Analytics,Customer Segmentation, Churn Analysis, and Risk Management,Real-World Case Studies in Business Analytics

Course Outcomes:

The course aims to help students:

CO-1: Apply business analytics techniques to solve practical problems.
CO-2: Use tools like R programming to analyze and visualize data.
CO-3: Understand predictive analysis methods such as regression and classification.
CO-4: Gain skills in marketing, finance, and supply chain analytics.
CO-5: Analyze big data to improve strategic decision-making.

Text Books

1. Prasad, R.N., & Acharya, S. (2011), Fundamentals Of Business Analytics. John Wiley & Sons.
2. Kumar, U.D. (2017). Business Analytics: The Science of Data-driven Decision Making.Wiley India.
3. JuliantPallant – "SPSS Survival: A step by step guide to data analysis using IBM SPSS" – McGraw Hill Education.
4. Daniel G. Murray - "Tableau Your Data!: Fast and Easy Visual Analysis with Tableau Software" - 2ndEdition

MBPC1009 MANAGEMENT INFORMATION SYSTEM (3-0-0)

Course Objectives:

1. Introduce foundational concepts, frameworks, and types of Management Information Systems (MIS) for effective implementation and management.
2. Familiarize students with strategic and operational systems like ERP, SCM, CRM, and their role in managing business functions.
3. Provide insights into emerging technologies, such as cloud computing and IoT, and their impact on business processes.
4. Develop skills in utilizing decision support and knowledge management systems for informed decision-making.

Module I

Introduction to MIS and Data Management

Introduction to MIS,Types of MIS, CCR framework, MIS capabilities, Role of Managers in IT Implementation and Adoption, Knowledge Management – Decision Support Systems, Expert Systems, Learning Management Systems, Executive Information Systems, Database Management Systems (DBMS) Concepts, Data Warehousing and Foundations of Business Intelligence

Module II

Strategic and Operational Support Systems

Strategic Enterprise Systems - ERP, SCM, CRM, SRM. Operational Support Systems - Manufacturing Systems, Sales and Marketing Systems, HRIS, Finance and Accounting Systems, Production and Inventory Systems. IT Strategy and Balanced Scorecard – IT strategies, IT- business alignment, balanced scorecard, cloud and vendor strategies

Module III

Emerging Technologies and Ethical Issues

Mobile and E-commerce – B2C, B2B and e-procurement, C2C and mobile commerce. Emerging Technologies – Cloud computing, Big Data Technologies, Internet of Things, Bring Your Own Device (BYoD,) Virtual Reality, Augmented Reality, Blockchain, Artificial Intelligence

Course Outcomes:

The course aims to help students:

CO-1: Apply MIS concepts to analyze and solve business problems using technology-drivenapproaches.

CO-2: Align IT strategies with business goals, effectively managing enterprise systems.

CO-3: Leverage emerging technologies to identify innovation opportunities.

CO-4: Use decision support and knowledge management systems for effective decision-making.

Text Books:

1. Louden, D. (2018). Management Information Systems: Managing the Digital Firm (15th ed.). Pearson.
2. R. De. (2018) MIS managing information system in business, government and society, publisher: willy. Second edition
3. Davis, G.B., & Olson, M.H.(2016).Management Information System. Tata McGraw-Hill.

MBPC1010 STRATEGIC MANAGEMENT (3-0-0)

Course Objectives:

1. To learn the major initiatives taken by a company's top management on behalf of corporates, involving resources and performance in businessenvironment.
2. To specify the Organization's mission, vision and objectives and developpolicies.
3. To understand the analysis and implementation of strategic management in strategic business units.

Module I

Strategy and Process: External & Internal Environment – Strategic Advantage Profile (SAP), Environmental Threat Opportunity Profile (ETOP), SWOC Analyses -Conceptual framework for strategic management, the Concept of Strategy and the Strategic Management Process – Stakeholders in business – Vision, Mission, Purpose, Objectives and Goals – Strategic intent – hierarchy of strategy – strategic business unit.

Module II

Industry Structure & Competitive Advantage:

Industry Analysis - Porter's Five Forces Model-Strategic Groups, Competitive Changes during Industry Evolution-Globalization and Industry Structure - Capabilities and competencies–core competencies-Low cost and differentiation - Generic Building Blocks of Competitive Advantage- Distinctive Competencies-Resources and Capabilities durability of competitive Advantage- Sustainable Competitive Advantage - Casestudy.

Module III

Strategy Implementation and Evaluation:

The genericstrategic alternatives – Stability, Expansion, Retrenchment and Combination strategies - Business level strategy- Strategy in the Global Environment-Corporate Strategy-Vertical Integration-Diversification and Strategic Alliances - Mergers & Acquisition (Concept) - Strategic analysis and choice – Business Portfolio Analysis – BCG Matrix and GE 9 Cell Model -Mc Kinsey's 7s Framework - Balance Score Card-case study.

Designing Strategic Control Systems- Matching structure and control to strategy-Implementing Strategic Change-Politics- Power and Conflict-Techniques of strategic evaluation & control-case study, Corporate Social Responsibility.

Course Outcomes:
CO-1: Interpret the concept of corporate strategy..
CO-2: Analyse the inter-linkages between the strategy of the organization and the structure of the organization.
CO-3: Identify the different levels of corporate strategy and able to chart strategies for the organisation that derive from both the external and internal analyses performed.
CO-4: Examine the reasons for developing Strategies and analyse the resources and capabilities of the organization.

Text Books:
1. Strategic Management & Business Policy, Azar Kazmi, TMH,
2. Strategic Management, R. Srinivasana, PHI,
3. Strategic Management, Haberberg&Rieple, Oxford ,
4. An Integrated approach to Strategic Management, Hill & Jones, Cengage ,
5. Strategic Management & Entrepreneurship, D.Acharya& A. Nanda,HPH

MBPC1011 INTRODUCTION TO AI (2-0-0)

Course Objectives:
The meaning behind common AI terminology, including neural networks, machine learning, deep learning, and data science.
1. What AI realistically can--and cannot—do
2. How to spot opportunities to apply AI to problems in your own organization
3. What it feels like to build machine learning and data science projects
4. How to work with an AI team and build an AI strategy in your company
5. How to navigate ethical and societal discussions surrounding AI

Though this course is largely non-technical, engineers can also take this course to learn the business aspects of AI.

Module-I
What is AI?
Introduction, Machine Learning, What is data?The terminology of AI, What makes an AI company?, What machine learning can and cannot do, More examples of what machine learning can and cannot do, Non-technical explanation of deep learning, Non-technical explanation of deep learning.

Module-II
Building AI Projects
Introduction, Workflow of a machine learning project, Workflow of a data science project, Every job function needs to learn how to use data, How to choose an AI project (Part 1), How to choose an AI project (Part 2), Working with an AI team, Technical tools for AI teams.

Module-III
Building AI in your Company
Introduction, Case study: Smart speaker, Case study: Self-driving car, Example roles of an AI team
AI Transformation Playbook (Part 1), AI Transformation Playbook (Part 2), AI pitfalls to avoid, Taking your first step in AI, Survey of major AI application areas, Survey of major

AI techniques
AI & Society
Introduction,A realistic view of AI, Discrimination / Bias, Adversarial attacks on AI, Adverse uses of AI, AI and developing economies, AI and jobs.

Course Outcomes:
CO-1: After completing the course, the students will be able to:
CO-2: Recognize fundamental AI concepts and vocabulary, discerning prominent figures in AI enterprises.
CO-3: Apply project methodologies in machine learning and data science, demonstrating adeptness in selecting and managing AI activities.
CO-4: Analyze deployment of AI solutions, and integrating advanced collaborative technologies for team synergy.
CO-5: Evaluate ethical dimensions of AI, perceptive biases, vulnerabilities, and societal consequences, development ethical awareness.
Reference Course Link
Course Link: https://www.coursera.org/learn/ai-for-everyone

MBPC1201 IT SKILLS FOR MANAGERS (0-0-2)

Course Objectives:
The aim of this course is:
1. Familiarize learners with essential office software tools and their applications in various settings.
2. Provide hands-on experience with Google Services and their integration into daily tasks.
3. Equip learners with Excel skills for efficient data analysis and reporting.
4. Introduce learners to the fundamentals of Database Management Systems (DBMS) and SQL for effective data management.

Module-I: Introduction to Office Software: Types of Office Software, Working with Google Services: Docs, Spreadsheet, Presenter, Sites, etc.

Module-II: Introduction to Advanced Excel: Getting started with Excel, working with Formulas & Functions and creating Charts & Graphs, Date Functions, Look Function. Statistical tools – use statistical functions such as average, Standard Deviation, IF function etc. Data analysis by using What IF, PIVOT table, Scenarios, Goal seek.

Module-III: Introduction to Database Management Systems (DBMS): Introduction to databases and their role in business, Types of databases (Relational, NoSQL, etc.), Database Management System (DBMS) functionalities, Advantages and limitations of using a DBMS, Entity-Relationship (ER) Diagrams for data modeling, Normalization Techniques (1NF, 2NF, 3NF)
Introduction to SQL (Structured Query Language), SQL concepts and syntax, Data Definition Language (DDL) - CREATE, ALTER, DROP statements, Data Manipulation Language (DML) - SELECT, INSERT, UPDATE, DELETE statements, working with queries (filtering, sorting, grouping, joining data).

Course Outcomes:

After completing the course, the students will be able to

CO-1: Proficiently apply the knowledge gained with essential office software tools and their diverse applications across various settings.

CO-2: Effectively integrate Google Services into their tasks, enabling streamlined workflows and enhanced productivity.

CO-3: Demonstrate competency in utilizing Excel for data analysis, including functions, formulas, and statistical tools.

CO-4: Gain proficiency in the principles of DBMS, encompassing database types, normalization, and SQL syntax, for efficient data management.

Reference Books:

- Foundations of Computing, 5th Edition, Sinha and Sinha, bpb publication
- Microsoft Excel Data Analysis and Business Modeling (Office 2021 and Microsoft 365) (Seventh Edition, Wayne L. Winston, PHI
- SQL ALL-IN-ONE, dummies for A Wiley Brand, 3rd Edition

MBQT1001 QUANTITATIVE TECHNIQUES (3-0-0)

Course Objectives:

1. To lay an adequate theoretical foundation to study various applied fields in statistics and decision science.
2. To understand role of quantitative techniques in managerial decision making.
3. To understand applications of various quantitative techniques in managerial settings.

Module-I

Statistical Methods:

Measures of central tendency and dispersion: Standard Deviation, Simple Correlation, calculation of correlation coefficient, probable error, Rank correlation. Regression: Linear regression, calculation of regression coefficients,

Module II

Linear Programming: Concept, Formulation & Graphical and Simplex Solution, Assignment Models: Concept, Flood's Technique / Hungarian Method, applications including restricted & multiple assignments. Transportation Models: Concept, Formulation, Problem types: Balanced, Unbalanced, Minimization, Maximization Basic initial solution using North West Corner, Least Cost & VAM, and Optimal Solution using MODI.

Module-III

Queuing Theory: Concept, Single Server (M/M/I,), Markov Chains & Simulation Techniques: Markov chains: Applications related to management functional areas, Decision Theory: Concept, Decision under risk (EMV) & uncertainty, Game Theory: Concept, Two players zero sum game theory with dominance, Pure & Mixed Strategy.

Course Outcomes:

CO-1: Demonstrate proficiency with statistical analysis of data. To lay adequate theoretical foundation to study various applied fields in statistics. To know how global business decisions depends on the statistical analysis of data and specific relationship between two or more variables.

CO-2: Develop the ability to build and assess data-based models. Quantitative analysis of data, problem solving approach and use of mathematical techniques.
CO-3: Recognize the importance and value of Operations Research and linear programming in solving practical problems in real business world. Interpret the transportation models' solutions and infer solutions to the real-world problems. Optimize the allocation of resources to Demand points in the best possible way using various techniques and minimize the cost or time of completion of number of jobs by number of persons.
CO-4: Recognize and solve game theory and Markove's chain. Know when simulation and dynamic programming can be applied in real world problems.
CO-5: Learn the context around which decisions must be taken, evaluate all factors involved developing possibilities, how to assess each possibility against set criteria to identify the best option and then how to develop that into a successful decision. Develop leadership quality to handle projects in real situation by using scientific tools, and implement suitable quality control measures.

Text Books

1. Quantitative Techniques for Management, Levine, Krehbiel, Berenson, Pearson
2. Quantitative Techniques in Management by N.D. Vohra Tata, McGraw Hill
3. Quantitative Techniques-Davis.B, Oxford
4. Operations Research by R. Pannerselvam, Prentice Hall
5. Statistics for Business and Economics; R P Hooda, Vikas
6. Operations Research by Nita Shah, Ravi Gor, Hardik oni, PHI
7. Business Statistics : J K Sharma, Vikas

MBQT1002 BUSINESS RESEARCH (3-0-0)

Course Objectives:

1. To equip the students with the basic understanding of the research methodology in changing business scenario.
2. To provide an insight into the application of dynamic analytical techniques to face the challenges, aimed at fulfilling the objective of business decision making.
3. To equip the students with the basic understanding of the research methodology in changing business scenario.
4. To provide an insight into the application of dynamic analytical techniques to face the stormy challenges, aimed at fulfilling the objective of business decision making.
5. To gain practical experience in using MS Excel and SPSS for forecasting and estimation.

Module I

Introduction to RM:

Meaning and significance of research. Importance of scientific research in business decision making. Types of research and research process. Identification of research problem and formulation of hypothesis. Research Designs. Primary data, Secondary data, Design of questionnaire; Sampling fundamentals and sample designs. Measurement and Scaling Techniques, Data Processing. Ethical conduct in research.

Module II

Data Analysis – I: Hypothesis testing; Z-test, t-test, F-test, chi-square test. Analysis of variance (One and Two way). Non-parametric, Test – Sign Test, Run test, Kruskal– Wallis test.

Module III

Data Analysis – II: Factor analysis, Multiple Regressions Analysis. Discriminant Analysis (Concept)

Report writing and presentation: Research Report, Types and significance, Structure of research report, Presentation of report.

Module IV (Business Research Lab: Using MS Excel and SPSS):

Descriptive Statistics in't' test, Testing of hypothesis, Chi-square, ANOVA, Correlation, Regression, Factor Analysis.

Course Outcomes:

CO-1: Utilize the knowledge of research methodology in solving various business problems.
CO-2: Distinguish various alternative course of action available for a particular situation.
CO-3: To introduce students to the tools and techniques of econometrics.
CO-4: To develop expertise in decision-making through the use of statistical tools and techniques.
CO-5: Judge and select best possible alternatives to solve business problems

Text Books:

1. Research Methodology by Khatua and Majhi, HPH.
2. Damodar Gujarati, Dawn C Porter, and Manoranjan Pal, Basic Econometrics, Mc Graw Hill
3. Research Methodology by Kothari, Newage
4. Research Methodology, by Deepak Chawla / NeenaSandhi (Vikas)
5. Management Research Methodology- Krishnaswamy,Pearson

Reference Books:

1. BRM by Zikmund / Babin / Carr / Adhikari / Griffin (Cengage)
2. Research Methodology, V. Upadade&A. Shende (S. Chand)
3. Business Research Methods by Prahlad Mishra, Oxford
4. Business Research Method by Cooper et.al, McGrawHill
5. Levin. Richard. I and Rubin. David. S 'Statistics for Management' Prentice-Hall
6. Brooks, Chris., 'Introductory Econometrics for Finance' Cambridge University Press
7. Hair, Anderson, Tatham and Black., 'Multivariate Data Analysis' Pearson Education India
8. Wooldridge M., Introductory Econometrics: A Modern Approach, Cengage Learning

Open Resources:

1. https://dbie.rbi.org.in/, https://data.oecd.org/

SYLLABUS

FOR

FIRST YEAR

INTEGRATED MBA PROGRAMME

(Effective from 2024-25)

2024-25

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA

ROURKELA

COURSE STRUCTURE

FIRST SEMESTER

Category	Subject Code	Subject	L-T-P	Credit	University Marks	Internal Marks
THEORY						
1. EV	IMEV1001	English Language Communication	3-0-0	3	100	50
2. EV	IMEV1002	Business Organisation	3-0-0	3	100	50
3. QT	IMQT1001	Business Statistics	3-0-0	3	100	50
4. PC	IMPC1001	Basic Financial Accounting-I	3-0-0	3	100	50
5. PC	IMPC1002	Fundamentals of IT	3-0-0	3	100	50
	Total		**15-0-0**	**15**	**500**	**250**
SESSIONAL / PRACTICAL						
6. EV	IMEV1201	English Language Communication Lab	0-0-2	2	-	100
7. PC	IMPC1201	Information Technology Lab	0-0-2	2	-	100
		Total	**15-0-4**	**04**	**-**	**200**
		Total Semester		**19**	**500**	**450**
		Grand Total (Theory + Practical) = 950				

SECOND SEMESTER

Category	Subject Code	Subject	L-T-P	Credit	University Marks	Internal Marks
THEORY						
1. EV	IMEV1003	Business Communication	3-0-0	3	100	50
2. EV	IMEV1004	Social Psychology	3-0-0	3	100	50
3. QT	IMQT1002	Quantitative Methods-I	3-0-0	3	100	50
4. PC	IMPC1003	Basic Financial Accounting-II	3-0-0	3	100	50
5. PC	IMPC1004	Marketing Management-I	3-0-0	3	100	50
	Total		**15-0-0**	**15**	**500**	**250**
SESSIONAL / PRACTICAL						
6. EV	IMEV1202	Business Communication Lab	0-0-2	2	-	100
7. QT	IMQT1201	Advance Excel- Lab	0-0-2	2	-	100
		Total	**15-0-4**	**04**	**-**	**200**
		Total Semester		**19**	**500**	**450**
		Grand Total (Theory + Practical) = 950				

IMEV1001 ENGLISH LANGUAGE COMMUNICATION (3-0-0)

Course Objectives:

The objectives of the course are;

1. To provide an overview of the process and types of communication, causes of miscommunication, and strategies for effective communication
2. To familiarize the learners with requisites for using the four language skills, namely, Listening, Speaking, Reading, and Writing
3. To put in use the basic mechanics of grammar, usage, and punctuation.

ModuleI: Basics ofCommunication

The Process of Communication & its elements; Barriers to communication & Strategies for overcoming them, Non-verbal communication: Kinesics; Oculesics; Proxemics; Chronemics; Haptics; Paralanguage; Appearance and Artifacts. Communication network in an organization: The Grapevine; Downward, Upward, Horizontal and Diagonal Channels. 7Cs' of effective communication.

ModuleII: Listening,Speaking and Reading Skills

Listening: Importance; Types of listening: Active listening; Content listening; Empathic listening; Critical listening. Strategies for improving listening skills.

Speaking: Characteristics of Effective Speech- Clear articulation; Rate of speaking; Voice quality; Eye Contact; Relevance of content for the audience.

The Sounds of English, IPA symbols, The Syllable- Division of words into syllables – Problem sounds for Indian learners of English. Stress– Word stress, Contrastive Stress- Rules of Intonation (Falling and Rising tones) in English.

Reading: Developing reading skills of skimming and scanning; predicting, guessing the meaning of unfamiliar words, inferring; Extensive and Intensive Reading.

Module – III: The WritingSkill & English Grammar.

Writing: The Writing Process; Characteristics of effective writing: clear organization and structuring of ideas, clarity of language, stylistic variation. Paragraph writing; Summary/ précis writing; Note-making.

Applied English Grammar: English verb types: Main and Auxiliary verbs; Stative and Dynamic; Transitive and Intransitive. Tenses; Subject-verb concord; Non-finite forms; Conditionals & Relative clauses; Parallel Structures; Punctuation.

Course Outcomes:

After completing the course, the students will be able to:

CO-1: Apply conceptual knowledge to enforce the basic concepts of communication, identify and overcome potential barriers in communication and use proper verbal and nonverbal modes of communication in an organisation.

CO-2: Analyse and implement effective listening and speaking skills for proper articulation of words and sentences and maintain proper eye contact and prepare relevant content for audience.

CO-3: Develop effective reading skills and maintain clarity in writing styles along with structuring ideas for stylistic variation in writing.

CO-4: Use Basic Grammar effectively in writing and speaking.

Reference Books:

1. Communication Skills, Sanjay Kumar & Pushpa Lata,Oxford
2. An introduction to Professional English and Soft Skills: Das et al, BPUT TextBook.
3. Business communication- Meenakshi Raman & Prakash Singh, OUP.
4. Effective Technical Communication, Ashraf Rizvi, McGraw Hill India.
5. A University Grammar of English, Quirk et al,Pearson

IMEV1002 BUSINESS OGRANISATION (3-0-0)

Course Objectives:

1. To provide the students an understanding of the nature of business activities and the environments within which they function.
2. To provide the theoretical and practical aspects of the operation of the various types and forms of business organizations.
3. To develop an understanding of the role of business activities in the modern world.

Module-I

Introduction to business: Meaning of business; nature of business; objectives of business: essentials of a successful business; qualities of a successful businessman; Classification of industries; Modern Business Environment: Characteristics, Challenges; Business Processes.

Business organization: Meaning: characteristics of an ideal form of business organization. Different forms of Business Organization

Module-II

Sole Trader: meaning; features; merits and demerits.

Partnership: meaning, characteristics; kinds of partners; partnership deed; advantages and disadvantages of partnership form of business organization: dissolution of partnership firms and different forms of Cooperatives.

Joint Stock Company: Meaning and definition; characteristics: kinds of companies; distinction between private and public company. merits and demerits of company form of business organization;

Statutory Corporations: Features, Merits &Limitations ; Formation of a company: Process.

Module-III

Organizational Structure: Formal and informal organization-Line Organization, Line and staff organization, Delegation, Decentralization, structural configurations of functional, Divisional, Matrix, Network, Virtual and learning organizations: Federal decentralization, Principles underlying designing of a structure.

Course Outcomes:

CO-1: Explain the concept of the various constituents of organisations and their impact on businesses.

CO-2: Demonstrate and develop conceptual framework of business organisations and generate interest in business.

CO-3: Interpret the definition of ethics, the importance and role of ethical behaviour in the business world today.

CO-4: Explain different ways of classifying businesses by size industries, sectors and industries type.

Reference Books:

1. Modern Business Organisation Management-S. A Sherleker, Himalaya
2. Publishing House
3. Modem business Organisation-J P Mahajan- Himalaya Publishing House

IMEV1003 BUSINESS COMMUNICATION (3-0-0)

Course Objectives:

1. To familiarize the learners with different formats of organizational communication
2. To infuse the correct practices and strategies of effective business writing and business presentation.
3. To put in use the basic mechanics of grammar, usage, and punctuation.
4. To impart instructions for preparing impressive Resumes.
5. To make the students ready for effective Group Discussions and impressive performance in job interviews.

Module-I: Writing Letters, Memos,E-mail:

- The Writing Process; Guidelines for composing effective messages;
- Business Letter: Parts of a Business Letter; Formats for typing a business letter; Writing routine, good-news & bad-news messages; Writing persuasive messages.
- Business Memo;
- Effective e-mail writing; Rules of Netiquette.
- Business Report:Features of a good business report. Formats- Printed form, Memo, Letter, manuscript; Structure of a short Formal Report. Steps in planning and preparing a business report.

Module-II: Designing & Delivering OralPresentations:

- Presentations: Planning, Preparing, Practicing, and delivering oral presentations; Enhancing oral presentations with Visual aids; Overcoming Stage Fright; Importance of body language during presentations; Question-Answer session after the presentation.
- Meetings: Preparing a notice-cum-agenda; Chairperson's role; Other role functions in a meeting; Content of the minutes of a meeting.
- Cross cultural communication: Technology in use - Video conferencing - Google Meet - Teams – Zoom: Arranging meetings.
  Social Media - Artificial Intelligence & Communication prompts.

Module-III: Writing employment messages and taking part in GD & Interviews:

- Preparing resumes and Job application letters; Resume: Parts of a Resume- Resume Styles: Chronological, Functional, and Chrono- Functional- Resume Design- Job Application letter.
- Group discussion: Types; How to prepare for GD; Parameters of Evaluation; Role Functions in GD; Non-functional Behaviour Patterns in GD; Guidelines for Effective Group Discussions.
- Interviews: Types by purpose; 3 stages of an interview; how to prepare for an interview; how to answer FAQs; Following up with a letter of thanks.

Course Outcomes:

After completing the course, the students will be able to:

CO-1: Distinguish among various levels of organizational communication and

communication barriers while developing an understanding of communication as an organizational process.

CO-2: Develop awareness of Techniques of active Listening and fluent speaking.

CO-3: Apply the reading strategies of Skimming, Scanning, and Inferring in the comprehension of the reading texts of various types.

CO-4: Demonstrate the ability to compose reasonably error-free business correspondence with brevity and clarity.

CO-5: Apply Creative thinking as well as critical thinking in preparing his/her resume, in writing Reports, and in taking part in Group Discussions, and in designing PPTs for presentation.

CO-6: Use appropriate communication skills in multicultural contexts, in social media, in web meetings, and in web browsing.

Books:

1. Business Communication Today – Bovee, Thill,Schatzman
2. Business Communication, Meenakshi Raman & Prakash Singh,Oxford
3. Business Communication- concepts, cases & applications, Chaturvedi &Chaturvedi, Pearson
4. Communication for Management, Urmila Rai and S M Rai,HPH
5. Business and Managerial Communication, Sengupta, PHI 5. BusinessCommunication for Managers, P. Mehra,Pearson
6. BCOM- Business Communication, Lehman, Sinha,Cengage

IMEV1004 SOCIAL PSYCHOLOGY (3-0-0)

Course Objectives:

1. Understand the socio-cultural influences on human development and behavior
2. Exhibit the ability to work respectfully and constructively with individuals of different backgrounds, values, and experiences
3. Demonstrate the ability to integrate multicultural concepts into psychology research, theory, practice, and service to others
4. Describe key concepts, principles, and overarching themes in psychology

Module-I

Introduction: Definition, Scope, Methods and Branches of Psychology (with special reference to Industrial/ Organization Psychology) , Major Viewpoints- Behavioristic approach, Gestalt, School, Psychoanalytic School.

Module-II

Sensation, Attention and Perception: (a)Attributes and classification of sensation (b) Attention Determinants, Shift, Fluctions, Distraction, (C)

Module-III

Learning Process: Factors of Learning, Theories- Connectionism, Classical and Operant Conditioning, Programmed Learning.
Memory: Encoding, Storage, Retrieval, STM, LTM, Other types , Forgetting- its causes.
Emotion: Reaction (types) Psychological basis.
Intelligence: Definition, Concept of IQ, Emotional Intelligence
Personality: Definition, Types, Traits, Tests

Course Outcomes:

CO-1: Develop insight and analyse the contribution of social psychologists to the understanding of human society.
CO-2: Evaluate effective strategies in socialization, group processes (both inter and intra-group) and helping behaviour.
CO-3: Register the progression of theories in major areas in Social Psychology.
CO-4: Interpret attitude formation and various methods to be used to change the attitude.
CO-5: Interpret aspects related to social psychology.

Books:

- Atkinson, R.L., Atkinson, R.C. Smith, E.E. &Hilgrad, ER: Introduction to Psychology, Harcourt Brace Java Publisher.
- Baron, R.A: Psyshology: The Essential Science, Allyn and Bacon.
- Morgan, C.T., King, R.A. Weisz, J.R. and Schopler, J: Introduction to Psychology McGraw Hill
- Munn, NL, Ferland, L.D., and Freeland, P.S. : Introduction to Psychology, Oxford, IBH Publishing.
- Woodworth, R.S., &Scholsberg, H: Experimental Psychology, Oxford & IBH Publishing.

IMEV1201 ENGLISH LANGUAGE COMMUNICATION LAB (0-0-2)

Course Objectives:

1. To improve the learners' proficiency in Listening, Speaking, Reading and Writing skills in English.
2. To enhance their active vocabulary by at least 300 new words.
3. To enable them to speak words and sentences with correct pronunciation of English sounds and with proper stress and information.

Lab sessions will be used to provide practice activities based on the content of all three modules of theory, with particular emphasis on the following:

1. Listening exercises
   (i) Taking a dictation
   (ii) Listening with a focus on pronunciation: segmental sounds, stress, weak forms,intonation.
   (iii) Listening for meaning: listening to a short talk / newsbulletin.
   (iv) Taking notes from alecture/speech.
2. Reading exercises
   (i) Reading comprehension; Speed reading practice
   (ii) Note making after reading a text, showing the main idea and supporting ideas and the relationship between them.
3. Writing exercises
   (i) Practice in writing paragraphs based on a Topic Sentence,
   (ii) Writing a Summary/ Precis.
4. Phonemic transcription usingIPA symbols.
   (i) Transcription of words in normal English orthography(writing)into IPAsymbols
   (ii) Phonemic transcription of words presentedorally
   (iii) Syllable division and stress marking (in words presented inphonetic transcription)

5. Speakingexercises
   (i) Introducing oneself and others
   (ii) Pronunciation practice (for accent neutralization), particularlyof problem sounds, in isolated words as well assentences.
   (iii) Practicing word stress, andintonation.
   (iv) Practice of 2 Minutes' speech on a contemporary topic.
6. Vocabularyexercises

Course Outcomes:

After completing the course, the students will be able to:

CO-1: Use conceptual knowledge of communication and use effective body language and proper articulation by implementing rules of pronunciation.

CO-2: Analyse and implement effective listening and speaking skills for proper articulation of words and sentences and focus on accent neutralisation.

CO-3: Develop effective writing styles along with structuring ideas for stylistic variation in writing for effective documentation.

CO-4: Use Basic Grammar effectively in writing and speaking and implement remedial measures to improve the same.

Book for Reference:

1. English Communication Skills- Raman & Singh
2. Effective Technical Communication- Ashraf Rizvi.

IMEV1202 BUSINESS COMMUNICATION LAB (0-0-2)

Course Objectives:

1. To enable the learners to draft appropriate messages in Business Letters, Memos, and E-mails in the correct format.
2. To give the learners practice in making presentations.
3. To give them practice in preparing impressive Resumes
4. To impart the ability to actively participate in GDs and to perform satisfactorily in job interviews.

The following are the main Activities to be conducted in Lab classes.

1. Delivering short speeches of 2 Minutes' duration.
2. Delivering PPTPresentations individually and in teams.
3. Writing BusinessLetters
4. Writing Memos andE-mails.
5. GroupDiscussions
6. Mockinterviews
7. Vocabulary exercises

Course Outcomes:

After completing the course, the students will be able to:

CO-1: Draft business letters, memos and e-mails in the correct form with reasonable accuracy of content.

CO-2: Deliver effective PPT presentations both individually and in a group.

CO-3: Participate in group Discussions with adequate content and analysis.

CO-4: Internalise effective techniques of answering questions and interacting in job interviews.

CO-5: Attain fluency in speech with enhancement of active vocabulary by at least 150 new words.

Reference Books:

1. English Language Lab, Nira Kanor, PHI
2. Guide to managerial Communication, Mary Munter,Pearson

IMPC1001 BASIC FINANCIAL ACCOUNTING - I (3-0-0)

Course Objectives:

1. To understand the need of accounting for a business.
2. To familiarize the students about the process of Accounting.
3. To know about the result of a business reflected by accounting statements.

Module -I

Introduction: Accounting as a language of business and need of Accounting, Accounting & Book keeping, Importance & objectives of Accounting, Basic Terminologies, users of accounting information, limitations of accounting, Accounting concepts &conventions, Accounting Standards, Accounting Equation and effect of transactions on Accounting Equation.

Module- II

Accounting Cycle, Type of Account, Journal, meaning, steps in Journalizing, golden rules for journal. Leger as book of secondary entry, process of ledger posting, Subsidiary book: Cash book single column, double column, triple column cash book and petty cash book, TrialBalance, meaning objectives and methods of preparing Trial Balance

Module- III

Capital Expenditure, Revenue Expenditures and Deferred Revenue Expenditure, Final Account: Preparation of Trading Account, Profit and Loss Account and Balance sheet, Final Account with Adjustment: Closing stock, outstanding expenses, prepaid expenses, Accrued Income, Provision for bad debt and Depreciation.

Course Outcomes:

CO-1: Interpret the process of accounting, uses and limitations.
CO-2: Identify the accounting concepts, principle and conventions.
CO-3: Solve, and examine the Journal Entries, Ledger, and Trial Balance.
CO-4: Prepare Financial Statements, Trading, Profit & Loss and Balance Sheet.

Reference Book:

1. Double Entry Book- Keeping, Juneja, Arora, Chawla, Kalyani
2. Financial Accounting, Maheshwari, Vikas
3. Financial Accounting Principle and Practices, Lal & Srivastava, S. CHAND

IMPC1002 FUNDAMENTALS OF IT (3-0-0)

Course Objectives:

The aim of this course is to:

1. Provide fundamental concepts and importance of Information Systems (IS) in modern business environments.

2. Provide knowledge of Database Management Systems (DBMS) and their role in data organization and management.
3. Explore the basics of Computer Networks, Internet Security, and their implications for business operations and data protection.
4. Learn about emerging trends in computing technologies and their applications in business and commerce.

Module - I:Information Systems for Business:
Need for Information Systems (IS), Business in the Information age, Information systems Concepts, Role of IT in various functional areas of business – Accounting & Finance, Marketing & Sales, Production & Logistics, and Human Resources Management Systems.

Module - III:Database Management Systems:
Database, Types of Databases, Components of a Database system. DBMS, DBMS language, Advantage and limitations of Database, Database models. Systems Planning - Traditional system development lifecycle (SDLC) - alternate methods for system development-dataflow analysis, System development outside the system.

Module-III: Basic Concepts of Computer Network &Internet Security:
Data Communication & Computer Network – Definition, Network Topologies Network Devices, Wireless Networking. Types of attacks, DOS attacks, Malicious Software, Hacking, Security Services, Security Mechanisms - Cryptography, Digital Signature, Firewall, Types of Firewalls, Identification& Authentication. ECommerce Overview- E-commerce Applications, M-Commerce Services & Applications, Emerging Trends in Computing.

Course Outcomes:
After completing the course, the students will be able to:
CO-1: Analyze and assess the role of information technology in diverse functional areas of business and its influence on strategic decision-making processes.
CO-2: Design and execute basic database management systems utilizing suitable database models and languages.
CO-3: Students will be able to evaluate network topologies, identify security threats, and apply appropriate security mechanisms to mitigate risks.
CO-4: Engage in discussions regarding emerging computing trends, including e-commerce applications, and their impacts on fostering business innovation and competitiveness.

Reference Books:
1. Foundations of Computing, 5th Edition, Sinha and Sinha, bpb publication
2. Management Information Systems: Managing the Digital Firm" by Kenneth C. Laudon and Jane P. Laudon
3. Database System Concepts, Seventh Edition by Avi Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill
4. Simplified Approach to DBMS By Parteek Bhatia Gurvinder Singh, Kalyani

IMPC1003 BASIC FINANCIAL ACCOUNTING - II (3-0-0)

Course Objectives:
1. To comprehend the significance of corporate accounting in financial reporting and management.

2. To master the processes involved in the issuance, management, and redemption of shares and debentures.
3. To apply advanced tools and techniques for financial statement analysis, including ratio analysis and cash flow statement evaluation.
4. To evaluate financial performance and make informed decisions based on comprehensive financial analysis.

Module-I: Accounting for Share Capital
Meaning and Importance of Corporate Accounting, Issue of shares, Payment in instalment, Journal entries for calls in Arrear and call-in advance, Forfeiture and Re-Issue of shares. Buyback of shares, understanding corporate Income statement and Balance sheet as presented in the Annual report of Companies.

Module-II: Accounting for Debentures
Issue of Debenture and Its classification, Different terms of issue of debenture, Redemption of debenture, Final accounts of limited liability companies as per the existing company Act, 2013 Contingency and events occurring after the balance sheet.

Module- III: Financial Statements analysis
Meaning, definition, objectives and uses of financial statement analysis, Tool or Techniques and Types of financial statementanalysis. Ratio analysis: Meaning, advantages and disadvantages, Types of ratios, Interpretation of ratio. Cash flow statement analysis, meaning, format, cash flow from operating activities, Investing Activities and Financing Activities (Indirect Method).

Course Outcomes:
CO-1: Demonstrate proficiency in recording transactions related to share capital, including installment payments, calls in arrears, and advanced calls.
CO-2: Apply knowledge of debenture issuance, classification, redemption, and compliance with regulatory requirements under the Companies Act, 2013.
CO-3: Utilize financial statement analysis tools and techniques to interpret corporate income statements, balance sheets, ratio analysis, and cash flow statements.
CO-4: Evaluate financial performance, liquidity, profitability, and solvency using advanced financial analysis methods, preparing them for roles in financial management and reporting.

Reference Book:
1. Double Entry Book-Keeping, Juneja, Arora, Chawla, Sahoo, Kalyani
2. Financial and Management Accounting, Satapathy & Sahoo, Vrinda
3. Financial Accounting and Analysis, Athma, HPH

IMPC1004 MARKETING MANAGEMENT - I (3-0-0)

Course Objective:
1. To sensitize the students to the dynamic nature of Marketing Management.
2. To expose students to a systematic frame work of marketing & implementations and to highlight need for different marketing approaches for services, goods, and for household consumers, organizational buyers.
3. To introduce the concept of Marketing Mix as a framework for Marketing Decision making.

4. The course is intended for defining and clarifying the concepts of marketing.

Module-I

Definition & Functions of Marketing:
Scope of Marketing, Core concepts of Marketing such as Need, Want, Demand, What can be marketed
Four Utilities of Marketing, Customer Perveived Value, Customer Satisfaction, Customer Delight, Customer Loyalty and types
Simple Marketing System, Modern Marketing System,

Evolution of Marketing concepts: Production, Product (with Marketing Myopia), Selling, Marketing and holistic
Understanding Markets: Potential market, Available market, Qualified available market, Target market, Penetrated market
Types of Market : B2B, B2C, B2G, Global, Not for Profit, Government, Marketplace, Marketsace, Metamarket,
Marketing v/s Market, Selling versus Marketing, Marketing Myopia. 80: 20 Principle, Bottom of the pyramid concept, Market Share, Market Size

Module-II

Concept of Marketing Environment: Need for analyzing the Marketing Environment. Macro and Micro environmental analysis or PESTEL analysis

STP concept -Segmentation: Definition, Need for segmentation, Benefits of segmentation to marketers, Criteria for effective segmentation,
Bases for market segmentation of consumer goods - Demographic, Geographic, Psychographic, Behavioural

Target Market: Concept of target market and criteria for selection of target market
Positioning: Concept of differentiation & positioning, Introduction to the concepts of Value Proposition, Point of Parity, Point of Difference or USP, Positioning errors.
Marketing Mix tools: 4Ps, 4As, 5Ps, 7Ps. Only concepts
Packaging &Labeling: Meaning & role of Packaging &Labeling.

Module-III

Understanding Consumer Behaviour:
Meaning & importance of Consumer behaviour, Difference between Customer and Consumer, Difference between Consumer buying behaviour and Organizational buying, Buyer roles , Factors affecting buying behaviour, Stages or Steps in consumer buying decision process, Buyer Black Box

Contemporary Topics (Concepts only) : Viral Marketing, Guerrilla Marketing, Ambush Marketing, Upselling and Cross selling, Societal and social Marketing, Relationship Marketing, Green Marketing , Digital Marketing, Network or Multi-level marketing, FOMO marketing, Customer Life Time Value

Course Outcomes:

CO-1: Identify the key analytical frameworks and tools used in marketing.
CO-2: Utilize the information of a firm's external and internal marketing environment to identify and prioritize appropriate marketing strategies.

CO-3: Design Segmentation, Targeting and Positioning strategies.
CO-4: Analyse different Buying Roles and interpret Consumer Buying Behaviour.

Text Books:
1. Marketing Management- A South Asian Perspective,13th Edition– Authors – Kotler, Keller, Koshy, Jha
2. Rajan Saxena, Marketing Management, TMH

Reference:
The above module has been prepared by referring to NPTEL Marketing Management-I Course by Prof. Jayanta Chatterjee and Prof. Shashi Shekhar Mishra | IIT Kanpur

IMPC1201 INFORMATION TECHNOLOGY LAB (0-0-2)

Course Objectives:
1. To know about the concept of Google Sheet and its Applications.
2. To know about the concept of DBMS/ RDBMS using MySQL / Oracle / Access.

Module - I
Introduction to Computer System, OS, Internet etc., Acquire the essentials for using & working with Google Services: Docs, Sheet, Presenter and Sites etc. Google Forms: Google's Form and Response sheet creation, in this section, you will learn how to send and receive forms through Google Drive so you can review them instantaneously. Google Mobile Apps: One of the greatest parts of using Google is its portability. This section shows you how to optimize the apps on your mobile device.Google Class Room: Learn about the Google Class Room, its use, importance, how teachers use it for assignments, mark etc.Google Calendar: Use of Google Calendar, how it is used, its importance etc.Google Sites: How to create site of your own using Google site, Over View of HTML, Design and importance of Web Design and Development.You Tube: Concept of You Tube, How to create You Tube Channel, Create short videos. Google Photo: Learn about the Google Photo, its use, importance, how teachers use it for editing photos, Uploading Photos etc.

Module - II
Introduction to DBMS / RDBMS using Oracle or MySQL, Learning Basic DML and DDL, Commands, Create, Alter, Truncate, View commands, Insert, Select, Delete, Update, Sort, Replace commands
N.B: All Computers must have Internet Connection and Assignments should design and developed by concerned faculty for students as per syllabus.

Course Outcomes:
CO-1: Create, Edit, Print and Share documents.
CO-2: Create, Edit, Print, Share and Present the Presentation.
CO-3: Apply the understanding of how various information & data representation in Spreadsheet.
CO-4: Outline the role of the Internet and ethical, social, & security issues of Internet Uses.

Text Books
- Google Apps for Dummies Karl Barksdale
- Learning Google Apps: Ramalingam Ganapathy
- Learning MySQL by Seyed M. M. Tahaghoghi

IMQT1001 BUSINESS STATISTICS (3-0-0)

Course Objectives:

1. To learn adequate theoretical; concept of statistics in various applied field in management decision making
2. To understand role of statistical tools in managerial decision making
3. To understand the applications of various quantitative techniques in managerial setting.

Module-I:

Statistics Introduction: Meaning and definitions of statistics; importance of statistics in business; limitations of statistics; types of data, collection of data; classification and tabulation of Data; graphic and diagrammatic presentation of Data. Measures of Central Tendency Introduction: The Arithmetic Mean; The Median: The Mode; comparison between mean, median and mode: The geometric Mean; The Harmonic Mean.

Module-II:

Measures of Dispersion: Introduction; The Range: The Quartile Deviation: The Mean Deviation; The Standard Deviation; Coefficient of Variation. Introduction, Skewness; Measures of Skewness; Moments; Kurtosis.

Module-III:

Probability,Introduction; Basic terminology in Probability; three types of Probability. Probability Axioms; Probability under conditions of statistical independence and dependence: Bayes' Theorem.

Course Outcomes:

CO-1: Collect, organize, and analyse data using appropriate statistical techniques and software tools.
CO-2: Demonstrate proficiency in descriptive statistics, including measures of central tendency, dispersion, and graphical representation of data.
CO-3: Build and evaluate predictive models using statistical methods, enabling them to forecast future trends, identify patterns, and make strategic decisions based on predictive analytics.
CO-4: Develop a solid understanding of probability theory and its applications in business contexts.

Books:

1. Statistics for Management - Lavin &Rubbin (TMH)
2. Statistical Methods and Quantitative Techniques- Digambar Patri (KP)

IMQT1002 QUANTITATIVE METHODS - I (3-0-0)

Course Objectives:

1. To learn adequate theoretical; concept of Quantitative techniques in various applied field in management decision making
2. To understand role of optimization techniques in managerial decision making
3. To understand the applications of various quantitative techniques in managerial setting.

Module-I:
Linear Programming:
Basic concept; Structure of Linear Programming Model; Application areas of Linear Programming. General Mathematical Model of Linear Programming Problem; Guidelines on Linear Programming Model Formulation; Examples of LP Model Formulation in various functional areas of management; Graphical Solution Method of LP Problems, The Simplex Method(Maximization Case; Minimization Case-Two Phase Method & Big M Method).

Module-II:
Transportation Problem:
Transportation Problem; Methods for Finding Initial Solution (North-West Comer Method, Least Cost Method, Vogel's Approximation); Test of Optimality- MODI Method Assignment Problem: Assignment Problem, Solution Methods of Assignment Problem- Hungarian Method for solving Assignment Problem; Variations in the Assignment Problem- Multiple Optimal solutions, Maximization Case in Assignment Problem, Unbalanced Assignment Problem, Restrictions on Assignments.

Module-III:
Decision Theory and Decision Tree:
Steps of Decision-making Process; Types of Decision Making Environment, Decision Making under Uncertainty (Optimism Criterion, Pessimism Criterion, Equal Probabilities criterion, Coefficient of Optimism Criterion, Regret Criterion); Decision Tree Analysis, Decision Making with Utilities.

Course Outcomes:
CO-1: Interpret Fundamental Concepts of Linear Programming.
CO-2: Evaluate and Solve Transportation Problems.
CO-3: Analyse and Solve Assignment Problems.
CO-4: Demonstrate Decision-Making Skills in Quantitative Environments.

Books:
1. Gupta & Hira, Operations Research, S.Chand.
2. Sharma,Operations Research, Macmillan

IMQT1201 ADVANCE EXCEL - LAB (0-0-2)

Course Objectives:
1. To master fundamental Excel functionalities including data entry, formatting, and basic formula usage.
2. To develop proficiency in advanced Excel features such as conditional formatting, data manipulation, and table creation.
3. To acquire skills in utilizing Excel shortcuts, functions, and data analysis techniques.
4. To gain an understanding of data visualization principles and practical applications within Excel.

Module - I
Introduction to Excel, Advance Excel, Data & Information. Excel Variables, Difference between DBMS and Excel Workbook. Creating, Entering, Editing and Formatting Data, Basic & Conditional Formatting Data, Managing Worksheets, Modifying Rows and Columns, Understanding Formulas and Functions, Changing Views, Data Freezing,

Merging, Custom Fills, AutoFill and Flash Fill, Use of Format Painter, Shapes. Creating Tables and Difference between Table and sheet Data.

Module - II

Excel Shortcuts, Copy, Paste and Paste Special options. Cell, Cell naming and Cell Referencing, Types of reference in Excel, Ranges and Dates, Difference between Formula and Function, Types of Function, Use of Text Functions. Use of Mathematic and Statistics functions Searching, Sorting, Filtering Data, Data Counting, Conditional Logic using If and Nested If, Difference between Total and Subtotals, Advance Data Filtering, Use of What-If Analysis, Data Ammonization in Excel, Data Validation, Data Protection, Introduction to Data Visualization, Visualize simple data and conditional data, Use of Look ups in Excel.

Course Outcomes:

CO-1: Demonstrate proficiency in Excel for data entry, formatting, and basic formula manipulation.

CO-2: Apply advanced Excel features including conditional formatting, data filtering, and table creation to manage and analyze data effectively.

CO-3: Utilize Excel shortcuts, functions, and data analysis techniques to streamline workflows and make informed decisions.

CO-4: Create visually appealing and informative data visualizations using Excel's visualization tools and functions.

Text Books:

- Microsoft Excel All in one by Greg Harvey
- Microsoft Excel Quick Start Guide for Beginners by William Fischer

SYLLABUS

FOR

FIRST YEAR

MCA PROGRAMME

(Effective from 2024-25)

2024-25

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA

ROURKELA

COURSE STRUCTURE

FIRST SEMESTER

Category	Subject Code	Subject	L-T-P	Credit	University Marks	Internal Marks
THEORY						
1. BS	MCBS1001	Discrete Mathematics	3-0-0	3	100	50
2. PC	MCPC1001	Digital Logic Design	3-0-0	3	100	50
3. PC	MCPC1002	Computer Networks	3-0-0	3	100	50
4. PC	MCPC1003	Programming for Problem Solving	3-0-0	3	100	50
5. PC	MCPC1004	Database Management Systems	3-0-0	3	100	50
6. HS	MCHS1001	Communicative English	2-0-0	2	100	50
	Total		**17-0-0**	**17**	**600**	**300**
SESSIONAL / PRACTICAL						
7. PC	MCPC1201	Computer Networks Lab.	0-0-3	1.5	-	100
8. PC	MCPC1202	C Programming Lab	0-0-3	1.5	-	100
9. PC	MCPC1203	Database Management Systems Lab	0-0-3	1.5	-	100
10. HS	MCHS1201	Language Lab	0-0-3	1.5	-	100
		Total	**17-0-12**	**06**	**-**	**400**
		Total Semester		**23**	**600**	**700**
		Grand Total (Theory + Practical) = 1300				

SECOND SEMESTER

Category	Subject Code	Subject	L-T-P	Credit	University Marks	Internal Marks
THEORY						
1. PC	MCPC1005	Object-Oriented Programming using JAVA	3-0-0	3	100	50
2. PC	MCPC1006	Software Engineering	3-0-0	3	100	50
3. PC	MCPC1007	Data Structures	3-0-0	3	100	50
4. PC	MCPC1008	Computer Organization and Architecture	3-0-0	3	100	50
5. PC	MCPC1009	Theory of Computation	3-0-0	3	100	50
6. HS	MCHS1002	Universal Human Values & Professional Ethics	2-0-0	2	100	50
	Total		**17-0-0**	**17**	**600**	**300**
SESSIONAL / PRACTICAL						
7. PC	MCPC1204	Object-Oriented Programming Lab	0-0-3	1.5	-	100
8. PC	MCPC1205	Software Engineering Lab	0-0-3	1.5	-	100
9. PC	MCPC1206	Data Structures Lab	0-0-3	1.5	-	100
10. PC	MCPC1207	Programming in Python Lab	0-0-3	1.5	-	100
		Total	**17-0-12**	**06**	**-**	**400**
		Total Semester		**23**	**600**	**700**
		Grand Total (Theory + Practical) = 1300				

MCBS1001 DISCRETE MATHEMATICS (3-0-0)

Course Objectives:

1. To learn the mathematical foundations required for computer science.
2. This course will help in understanding other courses in computer science.

Learning Outcomes:

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

CO1 : Define & describe various logical connectives and expressions along with rules of inferences.
CO2 : Apply various methods of proofs and proof strategies.
CO3 : Learn the concepts of function and develop the various algorithms and its complexity.
CO4 : Model counting techniques using recurrence relations & generating functions for applications.
CO5 : Develop the concepts and applications of graphs in various computer science problems

Module 1:

Logic and Proofs: Propositional logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs. Sets: Venn Diagrams, Subsets, The size of a set, Power Sets, Cartesian Products, Set Operations.

Module 2:

Functions: One-to-One and Onto Functions, Inverse Functions and Compositions of Functions Partial Functions. Sequences and Summations. Algorithms, Searching Algorithms: Linear Search, Binary Search, Sorting: Bubble Sort, Insertion Sort, The Growth of Functions, Complexity of Algorithms.

Module 3:

Counting: The Basics of Counting, The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients, Recurrence Relations.

Relations: Relations and their Properties, n-ary Relations and their Applications, Representing Relations, Closure of Relations, Equivalence Relations, Partial Orderings.

Module 4:

Graphs: Graph Terminology and Special Types of Graphs, Bipartite Graphs, Representing Graphs: Isomorphism of Graphs, Euler and Hamilton Paths, Shortest Path Problems: Dijkstra's Algorithm, Traveling Salesperson Problem, Planar Graphs, Graph Coloring. Trees: Tree Traversal, Minimum Spanning Trees.

Text Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Mc Graw Hills International Seventh Edition.
2. C. L. Liu, "Elements of Discrete Mathematics", McGraw Hills International Second Edition.

Reference Books:

1. Elements of Discrete Mathematics by C. L. Liu and D.P. Mohapatra, TMH, 2012
2. J. P Tremblay, R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", TMH, 1997.

MCHS1001 COMMUNICATIVE ENGLISH (2-0-0)

Course Objectives:

This course is designed to enhance the communication skills of MCA students, focusing on the specific needs of computer science professionals. The syllabus aims to develop proficiency in English for academic, professional, and everyday use.

Course Outcomes:

CO1: Students will be able to articulate the basic principles and processes of communication, identify and overcome common barriers, and distinguish between verbal and non-verbal communication methods.

CO2: Students will demonstrate improved listening skills through active listening techniques, effective comprehension, and the ability to engage in clear and confident public speaking, group discussions, and role plays.

CO3: Students will develop proficiency in writing professional documents including emails, memos, business letters, and technical reports, ensuring proper format, etiquette, and avoidance of plagiarism.

CO4: Students will be capable of preparing and delivering effective presentations using appropriate visual aids and tools, while also demonstrating a strong grasp of English grammar including state and event verbs, tense and aspect, and subject-verb agreement.

CO5: Students will understand the dynamics of interpersonal communication, the importance of workplace ethics, and cross-cultural communication. They will also learn to effectively communicate within teams, understand roles and responsibilities, and utilize collaborative tools and technologies.

CO6: Students will enhance their reading comprehension and critical analysis skills for both technical and non-technical texts, expand their vocabulary with strategies for learning new words and technical terms, and develop skills for writing effective blogs, social media posts, and website content.

Module 1: BASICS OF COMMUNICATION

1. Introduction to Communication: Definition and Process; Types of Communication: Verbal and Non-verbal; Barriers to Effective Communication
2. Listening Skills: Active Listening Techniques; Barriers to Effective Listening; Listening Comprehension Exercises
3. Speaking Skills: Basics of Pronunciation and Intonation; Public Speaking: Techniques and Practice; Group Discussions and Role Plays

Module 2: PROFESSIONAL COMMUNICATION

1. Business Writing: Email Writing: Format and Etiquette; Writing Memos and Notices; Business Letters: Inquiry, Complaint, and Job Application Letters; Writing Technical Reports; Avoiding Plagiarism
2. Presentation Skills: Preparing Effective Presentations; Visual Aids: Use of PowerPoint and Other Tools; Delivering Presentations with Confidence
3. Basics of English Grammar: State and Event Verbs; Tense and Aspect; Subject-Verb Agreement

Module 3: INTERPERSONAL SKILLS

1. Interpersonal Communication: Building Relationships through Communication; Importance of Ethics at the Workplace; Cross-Cultural Communication
2. Teamwork and Collaboration: Effective Team Communication; Roles and Responsibilities in a Team; Collaborative Tools and Technologies
3. Interview Skills: Preparing for an Interview; Common Interview Questions and Answers; Mock Interviews and Feedback

Module 4: ENHANCING LANGUAGE SKILLS

1. Reading Comprehension: Techniques for Effective Reading; Critical Reading and Analysis; Reading Technical and Non-Technical Texts
2. Vocabulary Building: Strategies for Learning New Words; Using Context Clues; Technical Vocabulary for Computer Science
3. Writing for the Web: Writing Blogs and Articles; Social Media Communication; Writing Content for Websites

TEXTBOOKS:

1. "Technical Communication" by Mike Markel
2. "English for Technical Communication" by Aysha Viswamohan
3. "Effective Technical Communication " by M Ashraf Rizvi

MCHS1201 LANGUAGE LAB (0-0-3)

These lab experiments aim to provide practical, hands-on experience in various aspects of communicative English, tailored to the needs of MCA students.

List of Experiments:

Module 1: BASICS OF COMMUNICATION

Experiment 1: Communication Role Play
Objective: Understand verbal and non-verbal communication.
Activities:

1. Role-play different scenarios (e.g., a business meeting, a social gathering) focusing on body language, gestures, and spoken words.
2. Identify and discuss the barriers encountered.

Experiment 2: Active Listening Exercises
Objective: Enhance listening skills.
Activities:

1. Listen to a recorded speech and answer comprehension questions.
2. Engage in a paired listening activity where one student speaks and the other practices active listening, followed by feedback.

Module 2: PROFESSIONAL COMMUNICATION

Experiment 3: Email Writing Practice
Objective: Develop proficiency in writing professional emails.
Activities:

1. Write emails for different purposes (e.g., inquiry, complaint).
2. Peer review and discuss the format, tone, and etiquette of each email.

Experiment 4: Presentation Preparation and Delivery
Objective: Improve presentation skills.
Activities:
1. Prepare a PowerPoint presentation on a technical topic.
2. Deliver the presentation to the class, focusing on clarity, confidence, and use of visual aids. Receive and give constructive feedback.

Module 3: INTERPERSONAL SKILLS
Experiment 5: Team Communication Simulation
Objective: Enhance teamwork and collaboration skills.
Activities:
1. Engage in a group project simulation where roles and responsibilities are assigned.
2. Use collaborative tools (e.g., Google Docs) to work together and present findings.

Experiment 6: Mock Interviews
Objective: Prepare for job interviews.
Activities:
1. Participate in mock interviews with common interview questions.
2. Receive feedback on responses, body language, and overall performance from peers and instructor.

Module 4: ENHANCING LANGUAGE SKILLS
Experiment 7: Critical Reading Analysis
Objective: Improve critical reading skills.
Activities:
1. Read a technical article and identify key points, arguments, and conclusions.
2. Discuss the article in groups, focusing on analysis and interpretation.

Experiment 8: Vocabulary Building Exercises
Objective: Expand vocabulary.
Activities:
1. Use context clues to understand and define new technical terms from computer science texts.
2. Create flashcards for new vocabulary and engage in peer quizzes.

Experiment 9: Writing a Technical Blog
Objective: Develop web writing skills.
Activities:
1. Write a blog post on a recent technological advancement or trend.
2. Peers review the posts focusing on clarity, conciseness, and engagement.

Experiment 10: Social Media Communication
Objective: Practice concise and effective writing for social media.
Activities:
1. Create social media posts (e.g., tweets, LinkedIn updates) about a technical topic.
2. Discuss the effectiveness and engagement of each post, considering the target audience.

MCPC1001 DIGITAL LOGIC DESIGN (3-0-0)

Course Objectives:

1. To introduce the fundamental concepts of digital logic and Boolean algebra.
2. To develop and understanding of combinational and sequential logic circuits.
3. To explore advanced topics such as memory elements, state machines, and programmable logic devices.

Course Outcomes: Upon successful completion of this course, students should be able to:

CO1 : Analyze and design combinational logic circuits using Boolean algebra and Karnaugh maps.
CO2 : Design and implement sequential logic circuits, including flip-flops, counters, and registers.
CO3 : Apply knowledge of digital logic to solve real-world engineering problems.

Module 1:
Binary Systems: Digital Computers and Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Boolean Algebra and Logic Gates: Boolean functions, Logic Operators, digital Logic Gates, Simplification of Boolean functions: Two and Three Variable Maps, Four Variable Map, Five Variable Map, Product of Sums Simplification, NAND and NOR Implementation, Don't Care Conditions.

Module 2:
Combinational Logic: Design Procedure, Adders, Subtractors, Code Conversion, Analysis Procedure, Multilevel NAND Circuits, Multilevel NOR Circuits, Exclusive OR Functions, Binary Adder and Subtractor, Decimal Adder, Magnitude Comparator, Decoders and Encoders, Multiplexers, Programmable Logic Array (PLA), Programmable Array Logic (PAL).

Module 3:
Flip-Flops: RS Flip-Flop, D Flip-Flop, JK and T Flip-Flops, Triggering of Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure, Design of Counters, Registers, Shift Register, Ripple Counters, Synchronous Counters, Timing Sequences, Random-Access Memory (RAM)

Module 4:
Semiconductor RAM Memories: Internal Organization of Memory Chips, Static Memories, Dynamic RAMs, Read-only Memories: ROM, PROM, EPROM, EEPROM, Flash Memory, Direct Memory Access, Memory Hierarchy, Cache Memory, Virtual Memory, Secondary Storage: Magnetic Hard Disks, Optical Disks, Magnetic Tape Systems
Memory elements: SRAM, DRAM, ROM, Programmable logic arrays (PLAs) and field-programmable gate arrays (FPGAs), Introduction to hardware description languages (HDLs) such as Verilog or VHDL, Introduction to digital simulation tools

Text Books:

1. "Digital Design" by M. Morris Mano and Michael D. Ciletti
2. "Fundamentals of Digital Logic with Verilog Design" by Stephen Brown and Zvonko Vranesic
3. "Computer Organisation and Embedded Systems" by Carl Hamacher, Z Vranesic, S Zaky and N Manjikian

Reference Books:

1. "Digital Systems: Principles and Applications" by Ronald J. Tocci, Neal S. Widmer, and Greg Moss
2. "Introduction to Logic Design" by Alan B. Marcovitz

MCPC1002 COMPUTER NETWORKS (3-0-0)

Objective :

1. Introduce students to the architecture, standards, and protocols of computer networks.
2. Provide an understanding of the functionalities of various network layers, including physical, data link, network, transport, and application layers.
3. Discuss the principles of routing, addressing, and internetworking in modern network environments.
4. Familiarize students with network applications, standard protocols, and techniques for ensuring quality of service and congestion control.

Module-I

Overview of the Internet: introduction to data communication, network application, Network hardware, Protocol, Layering Scenario, reference models: The OSI Model, TCP/ IP model, Internet history, standards and administration; Comparison of the OSI and TCP/ IP reference model. Physical Layer: data and signals: analog and digital, periodic analog signals, digital signals, transmission impairments, data rate limit, Guided transmission media, unguided transmission media, Wireless transmission, mobile telephone system.

Module–II

Data Link Layer: Design issues, error detection and correction design issues, elementary data link protocols, CRC codes, sliding window protocols, HDLC, the data link layer in the internet. Elementary Data Link Layer Protocols, sliding window protocols, noisy and noiseless channels.

THE MEDIUM ACCESS SUBLAYER: Channel allocations problem, multiple access protocols, Ethernet, Data Link Layer switching, Wireless LAN, Broadband Wireless, Bluetooth.

Module–III

Connecting devices: learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways, definition of multiplexing and types.

Network Layer: Network Layer Design issues, store and forward packet switching, connectionless and connection oriented networks-routing algorithms-optimality principle, circuit and packet switching, definition of flooding and multicast.

Module– IV

Routing protocols: Shortest Path, Routing uni-cast Distance Vector Routing, RIP, link state protocols, path vector routing. Internetworking: logical addressing, internet protocols, IP address, CIDR, IPv4 addressing, IPv6 Protocol addressing, addresses mapping, ICMP, IGMP,ARP,RARP, DHCP.

Module-V

Transport Protocols: process to process delivery, UDP, TCP, TCP Sliding Window, TCP Congestion Control, congestion control and quality of service.

Application Layer-World Wide Web, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS.

Course Outcome :

Upon successful completion of this course, students will be able to:

1. Explain the architecture and functioning of different network layers and their associated protocols.
2. Compare the OSI and TCP/IP reference models and understand their application in real-world networks.
3. Implement and troubleshoot data link layer protocols and error detection/correction methods.
4. Design and manage network systems using appropriate hardware and software tools, including IP addressing and routing protocols.
5. Utilize and manage network applications and protocols such as HTTP, FTP, email, TELNET, and DNS effectively.

Text Books :

1. "Computer Networking: A Top-Down Approach" by James F. Kurose and Keith W. Ross.
2. "Data Communications and Networking" by Behrouz A. Forouzan.

References :

1. Computer networks by Tanenbaum, A.S., Pearson Education India.
2. Computer Networks by Bhushan Trivedi, Oxford University Press

MCPC1003 PROGRAMMING FOR PROBLEM SOLVING (3-0-0)

Course Objectives:

1. To provide an understanding of basic programming concepts using the C programming language.
2. To develop problem-solving skills using C programming constructs.
3. To introduce students to algorithmic thinking and program design techniques.
4. To enable students to write, compile, and debug programs in C.

Course Outcomes (CO):

CO1: Understand the fundamental concepts of programming using the C language.
CO2: Develop problem-solving skills through the application of programming constructs in C.
CO3: Design and implement functions and algorithms to solve complex problems.
CO4: Demonstrate proficiency in using pointers, arrays, and structures in C programming.
CO5: Apply error handling and debugging techniques to identify and resolve programming errors.
CO6: Utilize file handling mechanisms in C for input/output operations.
CO7: Appreciate the importance of data structures and their implementation in C.

Module 1: Introduction to C Programming

Introduction to Problem Solving through programs, Flowcharts/Pseudo codes, the compilation process, Syntax and Semantic errors, Variables and Data Types , Arithmetic expressions, Relational Operations, Logical expressions; Conditional Branching and Iterative Loops.

Module 2: Functions and Arrays
Introduction to Functions, Function Prototypes and Declarations, Parameter Passing in Functions, Recursion, Arrays: 2-D arrays, Character Arrays and Strings.

Module 3: Pointers and Structures
Introduction to Pointers, Pointer Arithmetic, Dynamic Memory Allocation, Structures and Unions
File Handling in C, Self-Referential Structures and Introduction to Lists.

Module 4: Advanced Concepts in C
Preprocessor Directives, Command Line Arguments, Bitwise Operators, Error Handling and Debugging Techniques, Introduction to Data Structures in C.

Textbooks:
1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Reference Books:
1. "C Programming: A Modern Approach" by K.N. King
2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
3. "Let Us C" by Yashavant Kanetkar
4. "Programming in C" by Stephen G. Kochan

MCPC1004 DATABASE MANAGEMENT SYSTEMS (3-0-0)

Course Objective:
This course provides fundamental and practical knowledge on database concepts by means of organizing the information, storing and retrieve the information in an efficient and a flexible way from a well-structured relational model. This course ensures that every student will gain experience in creating data models and database design and be able to do the followings.

Focus the role of a database management system in an organization and construct ER Diagram.
Demonstrate basic database concepts, including the structure and operation of the relational data model and basic database queries using SQL.
Applying advanced database queries using Structured Query Language (SQL).
Evaluating logical database design principles and database normalization.
Demonstrate the concept of a database transaction, concurrency control, and data object locking and protocols.

Course Outcomes:
After successful completion of the course the student will be able to:
CO1: Understand database design principles.
CO2: Apply data Modelling using E-R diagrams.
CO3: Create refined data models using normalization.
CO4: Build database queries using Structured Query Language.
CO5: Understand the transaction management and concurrency control.

Module– 1

Introduction to DBMS: File system vs. DBMS, advantages of DBMS, storage data, queries, DBMS structure, Types of Databases – Hierarchical, Network, Relational, Key-Value, Object Oriented, XML DB Overview of File Structures in database, 3-schema architecture of DBMS, data independence, EF Codd Rule.

Module– 2

Data base Design: Data models, the importance of data models. E-R model: Entities, attributes and entity sets, relationship and relationship set, mapping cardinalities, keys, features of ER model, conceptual database design with ER model.

Relational model: Integrity constraints over relations and enforcement, querying relation data, logical database design, views, destroying/altering tables and views, Relational algebra, Extended relational algebra Operations.

Module- 3

Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies, Reasoning about Functional Dependencies. Normal Forms, Properties of Decomposition, Normalization, different types of dependencies.

Module– 4

Basic SQL: Introduction to SQL, Basic SQL Queries: DML, DDL, DCL, and TCL

Structured Query Language (SQL): Select Commands, Union, Intersection, Except, Nested Queries, Aggregate Operators, Null values, Relational set operators, SQL join operators

Relational Algebra (RA): Selection, Projection, Set operations, joins

Relational Calculus (TRC, DRC): Tuple Relational Calculus, Domain Relational Calculus PL/SQL, Assertions, Triggers. Introduction to Transaction Management: ACID properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-Based Concurrency Control. Concurrency Control: 2PL, Serializability and Recoverability, Introduction to Lock Management, Lock Conversions, Dealing with Deadlocks, Concurrency control without locking. Crash Recovery: Aries, Recovering from a System Crash.

Advanced Database: OODB, WEB based DB, Data warehousing and Data mining.

Textbooks:

1. H.F. Korth, A. Silverschatz, Abraham," Database system concepts", Tata McGraw Hill Publication, 6e, 2011
2. Raghu Ramakrishna and Johannes Gehrke, Database Management Systems, McGraw-Hill, 3e, 2014

References:

1. D. Ullman, Principles of Database and Knowledge – Base Systems, Vol. 1, 1/e, Computer Science Press, 1990.
2. Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Education, 7e, 2016.
3. Er. Rajiv chopra, "Database management systems, A Practical Approach", S. Chand Publishing

MCPC1201 COMPUTER NETWORKS LABORATORY (0-0-3)

Objective:
The Computer Networks Laboratory course aims to provide hands-on experience with the principles and practice of computer networks, focusing on both the theoretical and practical aspects of network design, implementation, and troubleshooting.

Course Outcomes:
By the end of the course, students will be able to:
1. Understand and implement various networking protocols.
2. Configure and troubleshoot network devices.
3. Analyze network performance.
4. Design and implement small-scale networks.

Laboratory Sessions:
1. Introduction to Network Lab Tools:
   - Overview of network simulation tools like Cisco Packet Tracer, GNS3, Wireshark.
   - Introduction to basic networking commands (ping, tracert, ipconfig/ ifconfig).
2. Basic Network Configuration:
   - Setting up a simple peer-to-peer network.
   - Configuring IP addresses and subnet masks.
   - Testing network connectivity using ping and tracert.
3. Error Detection and Correction:
   - Implementing CRC error detection.
   - Simulating error correction mechanisms.
4. Elementary Data Link Protocols:
   - Simulation of sliding window protocols.
   - Analysis of protocol performance over noisy and noiseless channels.
5. Medium Access Control:
   - Configuring and analyzing Ethernet networks.
   - Setting up and testing Wireless LAN (WLAN) connections.
   - Exploring Bluetooth network configurations.
6. Network Devices Configuration:
   - Setting up and configuring switches, routers, and gateways.
   - Understanding the use of repeaters, hubs, and bridges in a network.
7. Multiplexing Techniques:
   - Implementing and analyzing different types of multiplexing (TDM, FDM).
8. Routing Algorithms:
   - Implementing and analyzing shortest path routing algorithms.
   - Configuring Distance Vector Routing (RIP) and Link State Routing (OSPF).
9. IP Addressing and Subnetting:
   - Configuring IPv4 and IPv6 addressing.
   - Subnetting practice and exercises.
10. Address Mapping Protocols:
    - Implementing and analyzing ARP, RARP, ICMP, IGMP.
    - Configuring and testing DHCP.

11. Transport Layer Protocols:
    - o Simulation and analysis of TCP and UDP.
    - o Configuring TCP sliding window and congestion control mechanisms.
12. Quality of Service (QoS):
    - o Implementing and analyzing QoS in networks.
    - o Configuring QoS settings on network devices.
13. Application Layer Protocols:
    - o Setting up and testing HTTP, FTP, and DNS.
    - o Configuring and analyzing email protocols (SMTP, POP3, IMAP).
    - o Exploring TELNET and SSH for remote connectivity.

Reference Material:

- "Computer Networking: A Top-Down Approach" by James F. Kurose and Keith W. Ross.
- "Data Communications and Networking" by Behrouz A. Forouzan.
- Cisco Packet Tracer and GNS3 Documentation.

MCPC1202 C PROGRAMMING LAB (0-0-3)

List of Experiments:

1. Simple C programs.
2. Using If and switch constructs programs
3. Looping related problems
4. Programs using functions
5. If statement, If..else statement, nesting if else statement, else if ladder, switch statement, goto statement, while
6. statement, do statement, for statement
7. One-dimensional arrays, two dimensional arrays, multi dimensional arrays
8. Initialization of string variables, reading and writing strings, string handling functions
9. Programs using structures
10. Programs using unions
11. Initialization of pointer variables, address of variable, accessing a variable through its pointer
12. Pointer as Functions
13. Strings with Pointer: pointers and character strings, pointers and structures
14. Programs based on file handling
15. Command Line Arguments
16. Error Handling

MCPC1203 DATABASE MANAGEMENT SYSTEMS LAB (0-0-3)

List of Experiments:

1. Execute a single line and group functions for a table.
2. Execute DCL and TCL Commands.
3. Implement the query in SQL for a) insertion b) retrieval c) updating d) deletion.
4. Using Joins, Index, Key constraints and Normalization
5. Create views, partitions and locks for a particular DB
6. Write PL/SQL procedure for an application using exception handling
7. Write PL/SQL procedure for an application using cursors.

8. Write a DBMS program to prepare reports for an application using functions.
9. Write a PL/SQL block for transaction operations of a typical application using triggers.
10. Write a PL/SQL block for transaction operations of a typical application using package.
11. Design and develop an application using any front end and back end tool (make use of ER diagram and DFD).
12. Writing Assertion
13. Implementing operation on relation using PL/SQL
14. Creating Forms
15. Generating Reports

MCPC1005 OBJECT ORIENTED PROGRAMMING USING JAVA (3-0-0)

Course Objectives:

- To provide an understanding of basic programming concepts using the Java programming language.
- To develop problem-solving skills using Java programming constructs.
- To introduce students to algorithmic thinking and program design techniques and enable students to write, compile, and debug programs in Java.

Course Outcomes (CO):

CO1: Understand the fundamental concepts of programming using the Java language.
CO2: Develop problem-solving skills through the application of programming constructs in Java and design & implement functions and algorithms to solve complex problems.
CO3: Demonstrate proficiency in using pointers, arrays, and structures in Java programming.
CO4: Apply error handling and debugging techniques to identify and resolve programming errors.
CO5: Utilize file handling mechanisms in Java for input/output operations and appreciate the importance of data structures and their implementation in Java.

Module-I

JAVA BASICS: Review of Object-oriented concepts, History of Java, Java buzzwords, JVM architecture, Data types, Variables, Scope and life time of variables, arrays, operators, control statements, type conversion and casting, simple java program, constructors, methods, Static block, Static Data, Static Method String and String Buffer Classes, Using Java API Document.

Module-II

INHERITANCE AND POLYMORPHISM: Basic concepts, Types of inheritance, Member access rules, Usage of this and Super key word, Method Overloading, Method overriding, Abstract classes, Dynamic method dispatch, Usage of final keyword. PACKAGES AND INTERFACES: Defining package, Access protection, importing packages, Defining and Implementing interfaces, and Extending interfaces. I / O STREAMS: Concepts of streams, Stream classes- Byte and Character stream, Reading console Input and Writing Console output, File Handling.

Module-III
EXCEPTION HANDLING: Exception types, Usage of Try, Catch, Throw, Throws and Finally keywords, Built-in Exceptions, Creating own Exception classes. MULTI THREADING: Concepts of Thread, Thread life cycle, creating threads using Thread class and Runnable interface, Synchronization, Thread priorities, Inter Thread communication. AWT CONTROLS: The AWT class hierarchy, user interface components- Labels, Button, Text Components, Check Box, Check Box Group, Choice, List Box, Panels – Scroll Pane, Menu, Scroll Bar. Working with Frame class, Colour, Fonts and layout managers.

Module-IV
EVENT HANDLING: Events, Event sources, Event Listeners, Event Delegation Model (EDM), Handling Mouse and Keyboard Events, Adapter classes, Inner classes. SWINGS: Introduction to Swings, Hierarchy of swing components. Containers, Top level containers -JFrame, JWindow, JDialog, JPanel, JButton, JToggleButton, JCheckBox, JRadioButton, JLabel,JTextField, JTextArea, JList, JComboBox, JScrollPane. APPLETS: Life cycle of an Applet, Differences between Applets and Applications, Developing applets, simple applet.

Books:

1. Herbert schildt (2010), The complete reference, 7th edition, Tata Mc graw Hill, New Delhi
2. Programming with Java, E. Balagurusamy, McGraw-Hill Education, 6th Edition.
3. Head First Java, O'rielly publications 2. T. Budd (2009), An Introduction to Object Oriented Programming, 3rd edition, Pearson Education, India.
4. J. Nino, F. A. Hosch (2002), An Introduction to programming and OO design using Java, John Wiley & sons, New Jersey.
5. Y. Daniel Liang (2010), Introduction to Java programming, 7th edition, Pearson education, India.

MCPC1006 SOFTWARE ENGINEERING (3-0-0)

Objectives:
- To provide the idea of decomposing the given problem into Analysis, Design, Implementation, Testing and Maintenance phases.
- To provide an idea of using various process models in the software industry according to given circumstances.
- To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.

Course Outcomes(CO):
CO1: Students will be able to decompose the given project in various phases of a lifecycle.
CO2: Students will be able to choose appropriate process model depending on the user requirements.
CO3: Students will be able perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.
CO4: Students will be able to know various processes used in all the phases of the product.
CO5: Students can apply the knowledge, techniques and skills in the development of a software product.

Module-I
Introduction to Software Engineering: The evolving role of software, Changing Nature of Software. A Generic view of process: Software engineering- A layered technology, a process framework, Process patterns, process assessment, personal and team process models. Process models: The waterfall model, Incremental process models, Evolutionary process models, spiral, specialized process models, The Unified process.

Module-II
Requirement analysis: problems in information elicitation, methods of eliciting user requirements, functional and non-functional requirements, tools for requirement analysis, document flow charts, decision tables, data flow diagrams, data dictionaries, tools for analyzing real time systems, Use case diagrams, system sequence diagrams, CRC card, software requirement specification.

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, the software requirements document. Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management, software requirement specification.

Module-III
Software design: The design process, Function-oriented design, Data base oriented design, Object oriented design, Data base design. Coding: Code documentation, data declaration, statement construction, guidelines for input/output, efficiency with regard to code, memory and input/output.

Module-IV
Testing: Unit testing, black box and white box testing, test cases, integration testing, top-down and bottom-up testing, validation testing, alpha and beta testing, system testing. Maintenance: software reliability, availability, and maintainability, Reliability models. Risk management: software risks, Risk identification, Risk projection, Risk refinement, Quality Management: Quality concepts, Software quality assurance, Software reliability, The ISO 9000 quality standards.

Books
1. Software Engineering: A Practitioners Approach by Roger Pressman, 6th Edition, McGraw-Hill
2. Software Engineering by Ian Sommerville, Addison-Wesley
3. Fundamentals of Software Engineering by Rajiv Mall, PHI

MCPC1007 DATA STRUCTURES (3-0-0)

Objectives:
- Course objectives reflect specific knowledge, skills, abilities, or competencies that instructors expect students to acquire from a particular course.
- Course objectives are often very specific and detailed statements that describe the content or skills that will be taught in the classroom.
- In some regards, course objectives can be thought of as inputs of student learning, representing the many important details that faculty members will cover during a particular course.

Course Outcomes(CO):

After successful completion of the course the student will be able to:

CO1: To understand the role and application of Data Structure in real life.

CO2: To develop abstract data types for solving the complex problems.

CO3: To understand the concepts of non-linear data structure and application.

CO4: To analyze the efficiency of algorithms.

CO5: To describe the concept of Graph Theory in detail.

Module-I

Fundamentals: Introduction to Data Structures, Classification of Data Structures, Algorithms, Measuring Space and Time Complexities, Asymptotic Notations, Abstract Data Types.

Arrays: Storage Structures for Arrays, Sparse Matrixes, Strings, Pattern Matching.

Linked Lists: Dynamic Memory Management, Single Linked Lists, Double Linked Lists, Circular Linked Lists, Operations on Polynomials.

Stacks and Queues: Representation, Linked Stacks and Queues, Operations on Stacks and Queues, Applications of Stack and Queues.

Module-II

Trees: Terminology, Representation, Binary Trees, Binary Search Trees, Searching, Insertion and Deletions Operations in a Binary Search Tree, Height Balanced Trees, M-way Search Trees, B-Trees, B+ Trees, General Trees, Representation of General Trees and Binary Trees, Forests, Application of Trees.

Module-III

Graphs: Terminology, Representation, Path Matrix, Graph Traversal, Shortest Path Problems, Topological Sort.

Searching and Sorting Techniques: Linear and Binary Search, Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort, Heap and Heap Sort, Radix Sort, Comparison of Sorting Techniques.

Module-IV

Hashing: Hash Functions and Hashing Techniques. External sorting, Implementation using programming in C.

Books:

1. Data Structures Using C - Aaron M. Tenenbaum
2. Tremblay, Jean-Paul, and Paul G. Sorenson, "An introduction to data structures with applications", McGraw-Hill, Inc., 1984.
3. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, 2008, Universities Press Pvt. Ltd. Hyderabad.
4. Seymour, Lipchitz. "Data Structures with C."TMH (2010).

MCPC1008 COMPUTER ORGANIZATION AND ARCHITECTURE (3-0-0)

Objectives:

- To obtain the basic architectural and organizational concepts of a digital computer.
- To analyze performance issues in processor and memory design of a digital computer.
- To understand processor performance improvement using instruction level parallelism.

Course Outcomes(CO):

After successful completion of the course the student will be able to:

CO1: Understand background of internal communication of computer and have better idea on how to write assembly language programs.
CO2: Be clear with memory management techniques.
CO3: Understand the communication IO devices with processor.
CO4: Notice how to perform computer arithmetic operations.
CO5: Be clear with pipeline procedure and multi processors.

Module-I

Introduction: Review of basic computer architecture, Quantitative techniques in computer design, measuring and reporting performance.

Module-II

Pipelining : Basic concepts, Instruction and Arithmetic pipeline, Data hazards, Control hazards and Structural hazards, Techniques for handling hazards. Exception handling. Pipeline optimization techniques.

Module-III

Hierarchical memory technology: Inclusion, Coherence and locality properties, Cache memory organizations, Techniques for reducing cache misses; Virtual memory organization, Mapping and Management techniques, Memory replacement policies. Instruction-level Parallelism: Basic concepts, Techniques for increasing ILP, Superscalar, Superpipelined and VLIW Processor architectures. Array and Vector processors.

Module-IV

Multiprocessor architecture: Taxonomy of Parallel Architectures, Centralized shared-memory architecture, Synchronization, Memory consistency, Interconnection networks. Distributed shared memory architecture. Cluster computers.

Books:

1. Morris Mano," Computer System Architecture", PHI
2. William Stallings, "Computer Organization and Architecture – Designing for Performance", Sixth Edition, Pearson Education, 2003
3. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2002.
4. Patterson, "Computer Organisation and Design", Elsevier
5. John P Hayes, "Computer Organization", McGraw Hill

MCPC1009 THEORY OF COMPUTATION (3-0-0)

Objectives:

1. Apply theory of computation concepts to solve problems in computer science
2. Understand the fundamental concepts of automata theory, formal languages, and computation models
3. Analyze and design finite automata
4. Understand the basics of Theory of Computation, design and minimize finite automata
5. Study the properties of regular languages, context-free languages
6. Analyze and design pushdown automata, understand context-free grammars
7. Understand Turing machines, analyze undecidable problems and recursively enumerable languages
8. Analyze complexity, understand formal language properties

Course Outcomes(CO):

Upon successful completion of this course, the student shall be able to:

CO1: Apply finite automata concepts to solve problems and describe the types of grammar and derivation tree

CO2: Analyze a given Finite Automata machine and find out its Language and apply pushdown automata and context-free grammar concepts to solve problems

CO3: Apply Turing machine concepts to solve problems

CO4: Apply complexity theory and formal language property concepts to solve problems

CO5: Develop a computational model using Turing machine for the given problem. · Examine the complexity for P and NP completeness for the given problem.

Module-I

Introduction to Theory of Computation, Finite Automata (FA): Deterministic FA (DFA) and Nondeterministic FA (NFA), Finite Automata with Epsilon-Transition.

Module-II

Regular expressions, Finite automata and Regular expressions, Applications of regular expressions, Algebraic laws of regular expressions, Pumping Lemma and its application for regular languages, Closure and Decision properties of regular languages.

Module-III

Context-Free Grammars, Parse trees, Ambiguity in Grammar & Languages, Pushdown automation. The language of PDA. Equivalence of PDA's and CFG's. Deterministic pushdown automata, Chomsky Normal form, the pumping Lemma for context free languages, Decision properties of CFL's.

Module-IV

The Turing machine, Programming techniques for Turing machines, Extension to the basic Turing machine, Restricted Turing machine, Turing machines and computers.

Non-Recursively enumerable languages, Undecidable problem that in recursively enumerable, Undecidable problem about Turing machines, Post's correspondence problem, other undecidable problems.

Books:

1. Introduction to Automata Theory, Languages and Computation- J.Hoperoft, R.Motwani ,J.D.Ullman– Pearson Education

Reference Books:

1. Introduction to Theory of Computation– M.Siper, Thomson Learning
2. P.Linz," An Introduction to formal Languages and Automata",Norasa,2000
3. Lewish Papadimitra: Theory of Computations, Prentice Hall of India, New Delhi.

MCHS1002 UNIVERSAL HUMAN VALUES & PROFESSIONAL ETHICS (2-0-0)

Objectives:

This course is intended to:

1. To assist students in recognizing the fundamental interdependence between 'VALUES' and 'SKILLS' in achieving enduring happiness and prosperity, which are the primary objectives of all individuals.
2. To promote the cultivation of a holistic perspective among students regarding life, profession, happiness, and prosperity, grounded in an accurate comprehension of human reality and the broader existence. This comprehensive viewpoint underpins Universal Human Values and the transition towards a naturally value-oriented existence.
3. To emphasize the potential consequences of a holistic understanding regarding ethical human behavior, trustworthy and mutually satisfying interactions among individuals, and meaningful relationships with Nature.
4. This course aims to offer essential guidance in value education to inquisitive youth.

Course Outcomes (CO)

CO1 At the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature);

CO2 They would develop greater responsibility in life and in addressing issues with sustainable solutions, while considering human relationships and human nature.

CO3 They would possess enhanced critical faculties.

CO4 They would also develop sensitivity to their dedication to their understanding of human values, relationships, and society.

CO5 It is anticipated that they will apply their acquired knowledge to various real-life situations, marking a preliminary step in this direction.

Module-I

Introduction to Value Education

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations

Module-II

Harmony in the Human Being :

Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self,

Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health

Module-III

Harmony in the Family and Society: Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to- Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order

Module-IV

Harmony in the Nature/Existence :

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence.

Module-V

Implications of the Holistic Understanding – a Look at Professional Ethics : Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession

Books:

- The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978- 93-87034- 47-1
- The Teacher's Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G

Reference Books

- Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
- Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

MCPC1204 OBJECT ORIENTED PROGRAMMING LAB (0-0-3)

List of Programs:

1. Write a program in Java to find the set of prime numbers from 1 to 100.
2. Write a program to compare two objects. Create two objects representing two complex number and find the larger one.
3. Write a Java Program to convert a Number to Word.
4. Write a Java Program to copy all elements of one array into another array
5. Write a Java Program to sort the elements of an array in ascending order
6. Write a Java Program to find the frequency of odd & even numbers in the given matrix
7. Write a Java Program to determine whether a given string is palindrome
8. Write a Java program to draw a pattern such as

	000*000*
2 4	0*00*00*0
3 6 9	00*0*0*00
4 8 12 16	000***000

9. Write a Java program to convert Decimal to Binary in Java

10. Write a program to add two times given in hour minutes and seconds using class and object.
11. Write a Java program to find the combination c(n,r) by inheriting from a class that computes the factorial of a number.
12. Write a Java program to find the area of different geometrical shapes using polymorphism.
13. Write a Java program to create a user defined package that finds the largest among an array of n numbers. Use this package to sort an array of n numbers using insertion/selection sort.
14. Create three threads and print 1 to 10 in each thread.
15. Write a Java program to illustrate the concept of some exceptions such as divide by zero or array index out of bound etc.

MCPC1205 SOFTWARE ENGINEERING LAB (0-0-3)

List of Experiments:

1. Identifying the Requirements from Problem Statements.
   Requirements, Characteristics of Requirements, Categorization of Requirements, Functional Requirements, Identifying Functional Requirements
2. Estimation of Project Metrics
   Project Estimation Techniques, COCOMO, Basic COCOMO Model, Intermediate COCOMO Model, Complete COCOMO Model, Advantages of COCOMO, Drawbacks of COCOMO, Halstead's Complexity Metrics
3. Modeling UML Use Case Diagrams and Capturing Use Case Scenarios
   Use case diagrams, Actor, Use Case, Subject, Graphical Representation, Association between Actors and Use Cases, Use Case Relationships, Include Relationship, Extend Relationship, Generalization Relationship, Identifying Actors, Identifying Use cases, Guidelines for drawing Use Case diagrams
4. E-R Modeling from the Problem Statements
   Entity Relationship Model, Entity Set and Relationship Set, Attributes of Entity, Keys, Weak Entity, Entity Generalization and Specialization, Mapping Cardinalities, ER Diagram, Graphical Notations for ER Diagram, Importance of ER modeling
5. Identifying Domain Classes from the Problem Statements
   Domain Class, Traditional Techniques for Identification of Classes, Grammatical Approach Using Nouns, Advantages, Disadvantages, Using Generalization, Using Subclasses, Steps to Identify Domain Classes from Problem Statement, Advanced Concepts
6. Statechart and Activity Modeling
   Statechart Diagrams, Building Blocks of a Statechart Diagram, State, Transition, Action, Guidelines for drawing Statechart Diagrams, Activity Diagrams, Components of an Activity Diagram, Activity, Flow, Decision, Merge, Fork, Join, Note, Partition, Guidelines for drawing an Activity Diagram
7. Modeling UML Class Diagrams and Sequence diagrams
   Structural and Behavioral aspects, Class diagram, Elements in class diagram, Class, Relationships, Sequence diagram, Elements in sequence diagram, Object, Life-line bar, Messages
8. Modeling Data Flow Diagrams
   Data Flow Diagram, Graphical notations for Data Flow Diagram, Explanation of Symbols used in DFD, Context diagram and leveling DFD
9. Estimation of Test Coverage Metrics and Structural Complexity

Control Flow Graph, Terminologies, McCabe's Cyclomatic Complexity, Computing Cyclomatic Complexity, Optimum Value of Cyclomatic Complexity, Merits, Demerits

10. Designing Test Suites
Software Testing, Standards for Software Test Documentation, Testing Frameworks, Need for Software Testing, Test Cases and Test Suite, Types of Software Testing, Unit Testing, Integration Testing and System Testing.

MCPC1206 DATA STRUCTURE LAB (0-0-3)

List of experiments:

1 Implementation of Stack Using Array.
2 Implementation of Queue Using Array.
3 Implementation of Infix to Postfix Conversion using Stack.
4 Evaluation of Postfix Expression using Stack.
5 Implementation of the following operations on Single linked list:
i) Creation ii) Insertion iii) Deletion iv) Traversal in both ways
6 Implementation of the following operations on Double linked list:
i) Creation ii) Insertion iii) Deletion
7 Implementation of Stack Using Linked List.
8 Implementation of Queue Using Linked List.
9 Implementation of the following operations on Binary Tree:
i) Creation ii) Insertion iii) Deletion.
10 Implementation of Binary Tree Traversal : Preorder, Inorder and Postorder.
11 Implementation of Binary Search Tree.
12 Implementation of sorting algorithms : Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort and Heap sort.
13 Implementation of Searching Algorithms : Linear Search and Binary Search
14 Implementation of Breadth First Search (BFS) in a Graph.
15 Implementation of Depth First Search (DFS) in a Graph.
16 Implementation of Hashing using hash functions

MCPC1207 PROGRAMMING IN PYTHON LAB (0-0-3)

List of Programs:

1. Write a Program to read and print values of variables of different data types.
2. Write a program to perform addition, subtraction, multiplication, division and modulo division on two integers.
3. Write a program to input two numbers and check whether they are equal or not.
4. Write a program that prompts user to enter a character (O, A, B, C, F). Then using if-elseif-else construct display Outstanding, Very Good, Good, Average and Fail respectively.
5. Write a program to print Fibonacci series using recursion.
6. Write a program that prints absolute value, square root and cube root of a number. (import math package).
7. Write a program that finds the greatest of three given numbers using functions. Pass three arguments.
8. Write a program to get a string made of the first 2 and last 2 characters from a given string. If the string length is less than 2, return empty string.
9. Write a program that fetches data from a specified url and writes it in a file.

BACHELOR OF TECHNOLOGY
FOR ADMISSION BATCH 2023-24
CIVIL ENGINEERING
SECOND YEAR (THIRD SEMESTER)

Sl. No.	Category	Course Code	Course	Contact Hrs. L-T-P	Credit	University Marks	Internal Evaluation
Subject (Theory)							
1	BS	HSBS2001	Mathematics - III	3-0-0	3	100	50
2	PC	MEPC2001	Mechanics of Solids	3-0-0	3	100	50
3	PC	CIPC2002	Engineering Survey	3-0-0	3	100	50
4	PC	CIPC2003	Fluid Mechanics	3-0-0	3	100	50
5	PC(ACC)	PCAC2001	Python Programming	3-0-0	2	100	50
		PCAC2002	Data Science Foundations				
		PCAC2003	Web and Application Development				
		PCAC2004	Cloud Computing Foundation				
		PCAC2005	Programming Internet of Things				
		PCAC2006	Robotics : Motion Planning				
		PCAC2007	IT Fundamentals for Cybersecurity - I				
6	HS	HSHS2001	Engineering Economics	3-0-0	3	100	50
		HSHS2002	Organizational Behaviour				
Subject (Sessional / Practical)							
7	PC	CIPC2201	Building Drawing Practice	0-0-3	1.5	-	100
8	PC	CIPC2202	Fluid Mechanics Lab.	0-0-3	1.5	-	100
9	PC	CIPC2203	Material Testing Lab.	0-0-3	1.5	-	100
10	PC(ACC)	PCAC2201	Python Programming Lab.	0-0-3	1.5	-	100
		PCAC2202	Data Science Foundations Lab.				
		PCAC2203	Web and Application Development Lab.				
		PCAC2204	Cloud Computing Foundation Lab.				
		PCAC2205	Programming Internet of Things Lab.				
		PCAC2206	Robotics : Motion Planning Lab.				
		PCAC2207	IT Fundamentals for Cybersecurity - I Lab.				
			Total	**18-0-12**	**22**	**600**	700

Note: Click here to view/download the syllabus of the subjects.

CIPC2002 ENGINEERING SURVEY (3-0-0)

Course Objectives:

1. Ability to apply different methods of surveying suitable for a location and application
2. Ability to use different conventional and modern surveying instruments
3. Learn about referencing system, horizontal and vertical control for topographic mapping.
4. Understand different problems, issues and errors associated with survey data
5. Ability to record, analyze survey data, and check, remove and distribute survey errors.

Module-I

Linear measurements and chain surveying: Definition of surveying, classification of surveys, scales, types of chains and tapes, chaining and ranging, principles of chain survey, instruments, applications, errors and corrections, obstacles in chaining.

Module-II

Compass Traversing: Measurement of bearing, computation of angles from bearings, designation of bearings, fore bearing and back bearing, prismatic compass, principles of compass survey, local attraction and corrections, compass traverse and adjustments.

Module- III

Levelling and contouring: Principle, levelling instruments, dumpy level, classification of levelling, booking and reducing levels, profile and reciprocal levelling, curvature and refraction corrections, bubble tube and its sensitiveness, levelling difficulties, definition of contouring, contour interval, characteristics of contours, direct and indirect methods of contouring, interpolation of contours, contour gradient, uses of contour maps.

Module- IV

Theodolite Survey: Use of theodolite, temporary adjustment, measuring horizontal and vertical angles, theodolite traversing, included angles from bearings, fundamental lines and desired relations, errors in theodolite work.

Module- V

Modern Surveying Instruments: Electronic Distance Measurement, Corrections to measurement, Digital Theodolite, Total Stations, Global Positioning System, Introduction to Remote Sensing and GIS (Brief Introduction).

Course Outcome:

After this course the student shall:

- Apply the concepts of linear distance measurement for establishing the position of a point on ground.
- Able to find the angular measurement.

- Apply the concepts of height measurement to establish the vertical coordinate of a point on earth and prepare the contour map.
- Able to use theodolite to establish the spatial coordinates of a point on ground.
- Understand and apply modern equipment and technique for engineering survey.

Text Books:

1. Punmia, B.C., Jain, A.K. and Jain, A.K., Surveying Vol. I and II, Laxmi Publications (2016)
2. Surveying Vol-1 by R Agor, Khanna Publishers

Reference Books:

1. Chandra, A.M., Surveying Problem Solving, New Age International
2. Subramanian, R., Surveying and Leveling, Oxford University Press

CIPC2003 FLUID MECHANICS (3-0-0)

Course Objectives:

1. Explain about fluid properties and pressure measurement.
2. Analyze hydrostatic forces on surfaces and study of buoyancy and flotation.
3. Revise basics of kinematics and dynamics of fluid flow.
4. Observe flow through pipes and computation of coefficients of orifices and mouthpieces.
5. Differentiate between laminar and turbulent flows through pipe.

Module-I

Properties of fluids: Fundamental definitions, Density, specific weight, specific volume, specific gravity, viscosity, vapor pressure, compressibility and elasticity, surface tension and capillarity.

Fluid pressure and its measurement: Fluid pressure at a point, variation of pressure in a fluid, Pascal‘s law, atmospheric absolute, gauge and vacuum pressure, measurement of pressure.

Module-II

Hydrostatic pressure on submerged surface: Total pressure and centre of pressure, total pressure on plane surface(horizontal, vertical, inclined, curved),centre of pressure on vertical and inclined plane surface, pressure diagram, practical application of total pressure and centre of pressure(in dam, gate and water tank)

Buoyancy and Flotation: Buoyancy, buoyant force and centre of buoyancy, metacenter and metacentric height, stability of submerged and floating body, determination of metacentric height(experimental and theoretical)

Module-III

Kinematics of fluid flow: Introduction, velocity of fluid particles, types of fluid flow, flow pattern, basic principle of fluid flow, continuity equation, acceleration of a fluid particle,rotational and irrotational motion, circulation and vorticity, velocity potential, stream function, streamlines, equipotential lines, flow net, its uses and limitations

Dynamics of fluid flow: Introduction,forces acting on fluid in motion,Euler’s equation ofmotion,Bernoulli’s equation of motion,Kinetic energy correction factor,Bernoulli’s equation for acompressible fluid,pressure velocity relationship and its application (venture meter,orificemeter,nozzle meter),pitot tube,free liquid jet,vortex motion(free and forced)

Module-IV

Flow through pipes: Introduction, types of flow, laws of fluid friction(laminar flow and turbulent flow),Formulae for head loss due to friction in pipes(DarcyWeisbachequation,Chezy‘sformula,Manning‘s formula, Hazen-William‘s formula),other energy losses in pipe,Hydraulic grade line and energy grade line,flow through long pipes, flow through pipes (series,parallel,equivalent,by-pass,branched,syphonic),time of emptying a reservoir through pipe, transmission of power through pipe, flow through nozzle at the end of pipe, water hammer in pipe

Orifices and mouthpieces: Introduction, classification of orifices, flow through an orifice, hydraulic coefficients (velocity, contraction and discharge), flow through large orifices, classification of mouthpieces

Module-V

Laminar flow through pipes:Introduction,relation between shear pressure gradient, steady laminarflow in circular pipe,laminar flow through inclined pipes,laminar flow through annulus, laminar flowparallel plates (both plates at rest, one plate at rest and other moving),variation of friction factor f forlaminar flow, laminar flow around sphere, measurement of viscosity(viscometer)

Turbulent flow through pipes: Introduction, shear stress, hydro dynamically smooth and roughboundaries, velocity distribution for turbulent flow in hydro dynamically smooth and rough pipes,criteria for smooth and rough pipes, velocity distribution for turbulent flow in terms of mean velocityfor smooth and rough pipes, resistance to flow of fluid in smooth and rough pipes,criteria for hydrodynamically smooth and rough pipes,variation of friction factor for commercial pipes).

Course Outcome:

After completion of this course a student shall be able to:

- Explain about fluid properties and pressure measurement.
- Analyze hydrostatic forces on surfaces and study of buoyancy and flotation.
- Revise basics of kinematics and dynamics of fluid flow.
- Observe flow through pipes and computation of coefficients of orifices and mouthpieces.
- Differentiate between laminar and turbulent flows through pipe.

Text Books:

1. Hydraulics and Fluid Mechanics including Hydraulic Machines by P.N.Modi and S.M. Seth, Standard Book House.

Reference Books:

2. Fluid mechanics by A.K. Jain, Khanna Publishers.
3. Engineering Fluid Mechanics by K.L. Kumar, S. Chand & Co.
4. Fluid Mechanics by V.L. Streeter, MGH

CIPC2201 BUILDING DRAWING PRACTICE (0-0-3)

- Understanding drawing requirements and symbols in building drawing as per IS 962:1967
- Detailing of different building components: footing, masonry, stair case, and arches, etc.
- Development of plan, elevation, side view of 2/3 bed room residential/office building.
- Detailing RCC beams, columns and slabs, and preparing bar bending schedule.
- Detailing of steel roof trusses and connections.
- Any live project on drawing and detailing of Residential/Institutional building.

Text Books:

Civil Engineering Drawing by: M. Chakraborti

Reference Books:

Building Planning and Drawing by N. Kumara Swamy and A. Kameswara Rao, Charotar Publisher.

CIPC2202 FLUID MECHANICS LABORATORY (0-0-3)

1. Determination of Metacentric Height
2. Proof of Bernoulli's Theory
3. Determination of Coefficient of Discharge for V-notch
4. Determination of Coefficient of Discharge for Orifice meter
5. Determination of Coefficient of Discharge for Venturimeter
6. Determination of Reynold'sNumber
7. Determination of Darcy-Weisbach friction factor for pipe flow.
8. Study of Moody's chart for pipe flow.
9. Determination of losses due to bends, fittings and elbows in pipes
10. Study of free vortex and forced vortex.

MEPC2001 MECHANICS OF SOLID (3-0-0)

Module–I(08Hours)

Stress and Strain: Definition of stress, stress tensor - normal and shearing stresses in axially loaded members. Normal and shearing strains - stress-strain relationship - Generalized Hooke's Law - Poisson's ratio - relationship between material properties of isotropic materials - stress-strain diagram for uniaxial loading for ductile and brittle materials,strain gauges and rosettes, testing of materials with universal testing machine.Composite bars in tension and compression, temperature stresses.

Module–II(06Hours)

Two Dimensional State of Stress and Strain:Principalstresses,principalstrainsandprincipalaxes,calculationofprincipalstressesfromprincipalstrains, Mohr's Circle, Stressesinthincylinderandthinspherical shellsunderinternalpressure.

Module –III(08 Hours)

Shear Force and Bending Moment Diagram: For simple beams, support reactions for staticallydeterminant beams, relationship between bending moment and shear force, shear force and bendingmomentdiagrams.

Pure bending: Theory of initially straight beams, distribution of normal and shear stress, beams of twomaterials.Deflectionof beamsbyintegrationmethodandareamomentmethod.

Module – IV(04Hours)

Torsionofsolidcircularshafts,twistingmoment,strengthofsolidandhollowcircularshaftsand strength ofshaftsincombinedbendingandtwisting, Closed coiled helical springs.

Module – V(04Hours)

Bucklingofcolumns: Euler'stheoryofinitiallystraightcolumnswithvariousendconditions,Slenderness Ratio, Eccentricloadingofcolumns.Columnswithinitialcurvature.

Course Outcomes

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

- **CO1** Gain a fundamental understanding of the concepts of stress and strain by analysis ofsolids and structures.
- **CO2** Study engineering properties of materials, force-deformation, stress-strainrelationship & learn fundamental principles of equilibrium, compatibility, and force deformation relationship in linear solids and structures.
- **CO3** Analyze determinate and indeterminate axial members, torsional members, andbeams, and determine axial forces, torque, shear forces, and bending moments.
- **CO4** Learn the fundamental concepts of flexibility method,and stiffness method as applied to problems involving statically determinate andindeterminate axial and torsional members, and beams.
- **CO5** Analyze and design thin, thick cylinders and springs and buckling in columns.

TextBooks:

1. Strengthofmaterials,G. H. Ryder,McMillanIndiaLtd.
2. ElementsofStrengthofMaterials,S. P.Timoshenko, D.H.Young, East WestPress Pvt.Ltd.

ReferenceBooks:

1. Introductionto solidmechanics,H.Shames, Prentice HallIndia, NewDelhi
2. Engineeringmechanics of solid, E.P. Popov,Prentice Hall India, New Delhi
3. Mechanics of materials by Beer and Johnston, Tata McGraw Hill.

BACHELOR OF TECHNOLOGY
CIVIL ENGINEERING
SECOND YEAR (FOURTH SEMESTER)

W.E.F. ADMISSION BATCH 2023-24

Sl. No.	Category	Course Code	Course	Contact Hrs. L-T-P	Credit	University Marks	Internal Evaluation
Subject (Theory)							
1	PC	CIPC2004	Structural Analysis	3-0-0	3	100	50
2	PC	CIPC2005	Fluid Dynamics	3-0-0	3	100	50
3	PC	CIPC2006	Geotechnical Engineering	3-0-0	3	100	50
4	PC	CIPC2007	Water Supply & Sanitary Engineering	3-0-0	3	100	50
5	PC(ACC)	PCAC2008	Machine Learning Techniques and Applications	3-0-0	2	100	50
		PCAC2009	Big Data Integration and Management				
		PCAC2010	Application Development – Tools & Technologies				
		PCAC2011	Cloud Infrastructure & Applications				
		PCAC2012	Internet of Things and Cloud				
		PCAC2013	Robotics : Mobility & Design				
		PCAC2014	IT Fundamentals for Cybersecurity – II				
6	HS	HSHS2002	Organizational Behaviour	3-0-0	2	100	50
		HSHS2001	Engineering Economics				
Subject (Sessional / Practical)							
7	PC	CIPC2204	Survey Field Work	0-0-3	1.5	–	100
8	PC	CIPC2205	Geotechnical Laboratory	0-0-3	1.5	–	100
9	PC	CIPC2206	Water Supply & Sanitary Engineering Lab.	0-0-3	1.5	–	100
10	PC	CIPC2207	Computer Aided Design	0-0-3	1.5	–	100
			Total	**18-0-12**	**22**	**600**	**700**

Note : Minimum four (04) weeks of Summer Course / Training / Internship / Skill Course / etc. after 4th Semester.

Click here to view/download the syllabus of the subjects.

CIPC2004 STRUCTURAL ANALYSIS (3-0-0)

Course Objectives:

The course in Structural Analysis aims to provide students with a comprehensive understanding of structural mechanics and analysis techniques. It seeks to develop advanced knowledge of determining structural stability, analyzing complex loading conditions, and applying sophisticated mathematical methods to evaluate structural performance. Students will learn to assess determinate and indeterminate structures, understand energy principles, and apply various analytical techniques for analyzing beams, trusses, and arches. The objective is to equip students with theoretical and practical skills in analyzing structural systems using advanced computational and graphical methods.

Module- I (8 hours)

Concept of determinate and indeterminate structures, determination of degree of static andkinematic indeterminacy in plane frame and continuous structures.

Methods of Analysis: Equilibrium equations, compatibility requirements, Introduction to force anddisplacement methods.

Analysis of propped cantilever by consistent deformation method, Analysis of fixed andcontinuous beams by Moment-Area method, Conjugate beam method and theorem of threemoments.

Module- II (8 hours)

Energy theorems and its application, Strain energy method, Virtual work method, unit loadmethod, Betti's and Maxwell's laws, Castigliano's theorem, concept of minimum potential energy.Theories of failure, Maximum normal stress theory, maximum normal strain theory, maximum shearing strain theory,maximum strain energy theory, maximum distortion energy theory, maximum octahedral shearingstress theory.

Module- III (8 hours)

Analysis of redundant plane trusses.Deflection of pin jointed plane trusses using strain energy method, unit load method. Analytical method and Williot –Mohr diagram.Introduction to space truss.

Arches: Introduction and classification of arches, Bending moment, shear and normal thrust of three hinged archesSuspension Cables: Three hinged stiffening girders

Module- IV (8 hours)

Rolling loads and influence lines for determinate structures, simply supported beams, cantilever, Influence Line Diagram for reaction, shear force and bending moment at a section, Influence Line Diagram for wheel loads, point loads and uniformly distributed loads, maximum bending moment envelope.Influence Line Diagram for Bending Moment, Shear Force, normal thrust and radial shear forthree hinged arches.

Course Outcomes:

CO1: Analyze determinate and indeterminate structures, demonstrating proficiency in calculating degrees of static and kinematic indeterminacy for plane frames and continuous structures

CO2: Apply advanced energy methods and theorems, including strain energy, virtual work, and Castigliano's theorem, to solve complex structural engineering problems

CO3: Evaluate different theories of failure, critically understanding and comparing maximum stress, strain, and energy-based failure criteria for structural materials

CO4: Analyze redundant plane trusses and arches using advanced analytical techniques, including strain energy methods, Williot-Mohr diagrams, and graphical approaches

CO5: Develop and interpret influence line diagrams for various structural elements, demonstrating ability to assess loading conditions, reactions, shear forces, and bending moments in structural systems

Text Book &Reference Books:

1. R. C.Hibbeler,Structural analysis,Pearson Prentice Hall
2. K. Leet,C. M. Uang &A. M. Gilbert, Fundamentals of structural analysis. McGraw-Hill Higher Education.
3. Louis F. Geschwindner&Harry H.West, Fundamentals of Structural Analysis.Wiley publication
4. L. S. Negi, Theory and Problems in Structural Analysis, Tata-McGraw Hill.
5. C. S. Reddy. Basic structural analysis. McGraw Hill Education. S.S. Bhavikatti, Structural Analysis.Vikas Publishing House

CIPC2005 FLUID DYNAMICS (3-0-0)

Course Objectives:
The course in Fluid Dynamics aims to provide students with a comprehensive understanding of advanced fluid mechanics principles and their practical applications. It seeks to develop deep knowledge of boundary layer theory, momentum equations, fluid machinery, and complex flow systems. Students will explore theoretical concepts and real-world engineering applications, including analysis of pumps, turbines, open channel flows, and fluid dynamic phenomena. The objective is to equip students with sophisticated analytical skills to understand fluid behavior, computational techniques, and engineering design principles related to fluid systems and their dynamic interactions.

Module-I
Boundary Layer Theory: Introduction, thickness of boundary layer, boundary layer along a long thin plate and its characteristics, boundary layer equations, momentum integralequations of the boundary layer, laminar boundary layer, turbulent boundary layer, laminarsub-layer, boundary layer on rough surfaces, separation of boundary layer, methods ofcontrolling the boundary layer.
Drag and Lift: Introduction, Types of Drag, dimensional analysis of drag and lift, drag on a(sphere, cylinder, flat plate and air foil), effect of free surface on drag, effect ofcompressibility on drag, development of lift on immersed body, induced drag on an air foil,of finite length, polar diagram for lift and drag of an air foil.

Module-II
Momentum equation and its applications: Introduction, impulse momentum equation,momentum correction factor, application of impulse momentum equation, force on a pipebed, jet propulsion (orifice tank, ship), momentum theory of propellers, angular momentumprinciple
Impact of free jets: Introduction, force exerted by fluid jets on (stationary flat plate, movingflat plate, stationary curved vane, moving curved vane), Torque exerted on a wheel withradial curved vane

Module-III
Reciprocating Pump: Introduction, main components, types, work done (single acting anddouble acting),coefficient of discharge, slip, percentage slip and negative slip, effects ofacceleration of piston on velocity and pressure in suction and delivery pipes, indicatordiagram, operating characteristic curves
Centrifugal Pump: Introduction,advantages,component parts,working,types,work done by theimpeller,head,losses and efficiencies,minimum starting speed,loss of head due to reduced orincreased flow,diameter of impeller and pipes,specific speed, characteristic curves, cavitation,priming devices, troubles and remedies
Turbines: Introduction,elements of hydraulic power plant,head and efficiencies of hydraulic turbine, classification.
Pelton wheel: work done and efficiencies,working proportions,design of runner, multiple jetwheel.
Radial flow impulse turbine: reaction turbine, Francis turbine, work done and efficiencies, working proportions, design of runner, draft tube theory, Kaplan turbine, workingproportions. Expression for specific speed in terms of known coefficients for different turbines,performance characteristic curves.

Classification, reaction, impulse, outward flow, inward flow & mixed flow turbines, Francis& Kaplan turbines, Pelton Wheel, Physical description and principle of operation, Governingof turbine.

Module-IV

Uniform flow in open channels: Introduction, types, geometrical properties, velocitydistribution, uniform flow, most economical section, computation of uniform flow, specificenergy and critical depth, specific force, critical flow and its computation, application ofspecific energy to channel transitions

Non-uniform flow in open channel: Introduction, gradually varied flow, classification ofcannel bottom slopes, classification of surface profiles, characteristics of surface profiles,integration of varied flow equations, hydraulic jump, location of hydraulic jump, surges inopen channel

Flow over notches and weirs: Introduction, classification, sharp-crested weir, rectangularweir, triangular weir, trapezoidal weir, broad-crested weir.

Measurement of depth of flow: point gauge, hook gauge, float gauge

Course Outcomes:

1. To adopt the dimensional analysis and study of viscous incompressible flow
2. To understand the boundary layer growth and its application in drag and lift phenomena
3. To study momentum equation and its application in impact of jet
4. To analyse velocity triangles for different pumps and turbine
5. To understand the basics of open channel flow and detail flow profiles

Text and Reference Books:

1. S. K. Som and G. Biswas, Fluid Mechanics and Fluid Machines, Tata. McGraw Hill Publishing Company
2. P. N. Modi and S. M. Seth, Hydraulic and Fluid Mechanics, Standard Book House, New Delhi
3. JagdishLal, Hydraulics and Fluid Mechanics, Tata McGraw Hill
4. R. K. Bansal, Fluid Mechanics and Hyd. Machines, Laxmi publisher, New Delhi
5. K. Subramanya, Fluid Mechanics and Hydraulic Machines, McGraw Hill Education
6. A.K. Jain, Fluid Mechanics, Khanna Publishers
7. SukumarPati, Textbook of Fluid Mechanics and Hydraulic Machines,McGraw Hill Education

CIPC2006 GEOTECHNICAL ENGINEERING (3-0-0)

Course Objectives:
The course in Geotechnical Engineering aims to provide students with a comprehensive understanding of soil mechanics and its engineering applications. It seeks to develop advanced knowledge of soil formation, classification, and behavior under various stress conditions. Students will explore critical concepts including soil properties, permeability, seepage, compaction, consolidation, and shear strength. The objective is to equip students with theoretical and practical skills in analyzing soil systems, understanding complex geotechnical phenomena, and applying sophisticated techniques for soil characterization, testing, and stabilization in civil engineering and construction contexts.

Module-I
Introduction: Origin of soils, formation of soils, clay mineralogy and soil structure, basic terminology and their relations, index properties of soils. Soil classification: Particle size distribution, use of particle size distribution curve, Particle size classification, textural classification, HRB classification, Unified classification system, Indian standard soil classification system, Field identification of soils. Capillary tension, capillary siphoning. Stress conditions in soil: Total stress, pore pressure and effective stress

Module-II
Permeability: Darcy‘s law, permeability, factors affecting permeability, determination of permeability(laboratory and field methods), permeability of stratified soil deposits. Estimation of yield from wells.
Seepage analysis: Seepage pressure, quick condition, Laplace equation for two –dimensional flow, flow net, properties and methods of construction of flow net, application of flow net, seepage through anisotropic soil and non-homogenous soil, seepage through earth dam. Inverted filter and design of inverted filter.

Module-III
Soil compaction: Compaction mechanism, factors affecting compaction, effect of compaction on soil properties, density moisture content relationship in compaction test, standard and modified proctor compaction tests, field compaction methods, relative compaction, compaction control.
Soil consolidation: Introduction, spring analogy, one dimensional consolidation, Terzaghi‘s theory of one dimensional consolidation, consolidation test, determination of coefficient of consolidation

Module-IV
Shear strength of soils: Mohr‘s stress circle, theory of failure for soils, determination of shear strength(direct shear test, tri-axial compression test, unconfined compression test, van shear test), shear characteristics of cohesion less soils and cohesive soils.

Module-V
Stabilization of soil: Introduction, mechanical stabilization, cement stabilization, lime stabilization, bituminous stabilization, chemical stabilization, thermal stabilization, electrical stabilization, Introduction to modern methods of stabilization

Course Outcomes:

1. To Classify soil and solve three phase soil system
2. To Solve any practical problems related to soil stresses estimation, permeability and seepage including flow net diagram.
3. To Formulate practical problems related to consolidation settlement and time rate of settlement.
4. To Validate problem related to compaction in the field.
5. To Use stabilization techniques for soft and expansive soil by using various methods

Text and Reference Books:

1. S. K. Gulhati and M. Datta, Geotechnical Engineering, McGraw Hill Company
2. V. N. S. Murthy, Principles of Soil Mechanics and Foundation Engg, UBSPD.
3. I. H. Khan, A text book of Geo-technical Engg, Prentice Hall India.
4. B. C. Punmia, A text Book of Geo-technical Engg, Laxmi Publications.
5. G. Ranjan& A. S. R. Rao, Basic and Applied Soil Mechanics, Wiley Eastern Ltd.
6. K. R. Arora, Soil Mechanics and Foundation Engineering, Standard Publisher
7. Venkatramaiah, Geotechnical Engineering, New Age International publishers.

CIPC2007 WATER SUPPLY & SANITARY ENGINEERING (3-0-0)

Course Objectives:

The course in Water Supply & Sanitary Engineering aims to provide students with a comprehensive understanding of water resource management, treatment technologies, and environmental engineering principles. It seeks to develop advanced knowledge of water supply systems, wastewater treatment, and solid waste management. Students will explore critical concepts including water quality, treatment processes, effluent management, and sustainable environmental solutions. The objective is to equip students with theoretical and practical skills in analyzing water systems, understanding complex treatment technologies, and applying sophisticated techniques for ensuring public health, environmental protection, and sustainable water resource management.

Module-I

Quantity of water: Sources of water, Per capita demand, design period, population forecast, fluctuation in demand.

General requirement for water supply: Types of intakes, Pumping and Transportation of water.

Quality of water: Physical, chemical and biological characteristics of water and their significance, necessity of treatment, Drinking water standards

Module-II

Basic unit operations and unit processes for surface water treatment: Screening, Plain Sedimentation, Sedimentation aided with Coagulation, Filtration, Disinfection, Softening Miscellaneous treatments (principles only): Removal of colours, tastes and odours, removal of iron and manganese, fluoridation and defloridation, Ion exchange, electro-dialysis, RO

Module-III

Quantity and characteristics of wastewater, effluent discharge standards.

Domestic wastewater treatment: Primary treatment, Screening, Grit removal, Sedimentation, Sedimentation aided with coagulation. Secondary treatment: Basis of microbiology, Growth and food utilization, Suspended-culture systems, Attached-culture systems, Secondary clarification, Disinfections of effluents. Sludge treatment and disposal: Sludge characteristics, thickening, disposal

Module-IV

Solid waste management: Source, classification, characteristics, generation, collection, Storage and transport of MSW, MSW management, Waste minimization of MSW, Reuse and recycling, Biological & thermal treatment (principles only), land fill

Course Outcomes:

1. To explore the sources of water, general requirement for water supply and characterize water.
2. To study the principles of water treatment and design treatment units.
3. To understand the principles of waste water treatment and design treatment units.
4. To Explain components of solid waste management and evaluate recovery, treatment and disposal alternatives.

Text and Reference Books:

1. Environmental Engineering (Volume I & II) by S. K. Garg-Khanna Publishers
2. Environmental Engineering (Volume I &II) by B. C. Punmia-Khanna Publishers
3. Environmental Engineering by H. S. Peavy, D.R. Rowe and G. Tchobanoglous, MGH.

CIPC2204 SURVEY FIELD WORK (0-0-3)

1. Testing of chain and measurement of correct length of the line and chain traversing.
2. Traversing by Compass
3. Horizontal and vertical angle measurement by theodolite
4. Traversing by theodolite
5. Use of dumpy level and automatic level for fly levelling.
6. Contouring of an area
7. Measurement of distance, horizontal and vertical angle by Total Station
8. Contouring by Total Station

Course Outcomes:

1. To prepare a layout of certain area using different techniques.
2. To study the Total Station and its use for measurement of angle and distance
3. To prepare a contour map using Total Station

CIPC2205 GEOTECHNICAL LABORATORY (0-0-3)

Course Content

1. Determination of specific gravity of soil grains
2. Determination of grain size distribution of soil: (a) sieve analysis; (b) Hydrometer/pipette test
3. Determination of Atterberg limits of soil: (a) liquid limit, (b) plastic limit, (c) shrinkage limit
4. Measurement of unit weight of soil in the field: (a) Core cutter method, (b) Sand replacement method
5. Determination of Density-water content relationship of soil: Proctor compaction tests.
6. Determination of relative density of granular soil
7. Determination of shear strength of soil: (a) Direct shear test (b) Tri-axial shear test, (c)
   Unconfined compression test (d) Vane shear test
8. Determination of consolidation characteristics of soil using fixed ring Oedometer
9. Determination of California Bearing Ratio (CBR) of soaked and un-soaked soil samples
10. Determination of coefficient of permeability of soil: (a) Constant head Permeameter (b) Falling Head Permeameter

Course Outcomes:

1. To classify soil by physical observation of the soils.
2. To observe soil based on estimated index and engineering characteristics of soil
3. To Examine soil properties in field
4. To estimate density water content relationship
5. Measure consolidation and shear parameter to design foundation

CIPC2206 WATER SUPPLY & SANITARY ENGINEERING LABORATORY (0-0-3)

Course Content

1. Determination of Taste, Odour and Colour of water/wastewater sample
2. Determination of pH, Temperature, E. Conductivity and D.O. of water/wastewater sample
3. Determination of TS, TDS and SS of water/wastewater sample
4. Determination of hardness & alkalinity of water sample
5. Determination of Turbidity and $SO_4^{-2}$of water sample
6. Determination of Ca^{+2}, Na^{+} and K^{+} of water sample
7. Determination of residual chlorine and Cl^{-} of water sample
8. Determination of BOD of water/wastewater sample
9. Determination of COD of water/wastewater sample
10. Microbiological analysis of water/wastewater sample

Course Outcomes:

1. To determine the physical characteristics of water.
2. To explore the chemical characteristics of water.
3. To study of biological characteristics of water.
4. To analyse the physical characteristics of wastewater.
5. To examine the chemical and biological characteristics of wastewater.

CIPC2207 COMPUTER AIDED DESIGN (0-0-3)

Course Content

1. Introduction to MATLAB and Excel
2. Plotting of Shear force and bending moment diagram of beam using MATLAB
3. Drawing of Shear force and bending moment diagram of frames using MATLAB
4. Plotting of Shear force and bending moment diagram of arches using MATLAB
5. Calculation and plotting of ILDsof beam using MATLAB
6. Calculation and plotting of ILDs of frames using MATLAB
7. Calculation and plotting of ILDs of arches using MATLAB
8. Plotting of stress contours using MATLAB
9. Introduction to Graphic Software: Basic commands, plotting of graphs and data analysis.

Course Outcomes:

1. Use Plotting of SFD and BMD for beam and frame structures.
2. Explain Plotting of graphs, contours and calculation of statistical information for data.

BACHELOR OF TECHNOLOGY
CIVIL ENGINEERING
THIRD YEAR (FIFTH SEMESTER)

W.E.F. ADMISSION BATCH 2023-24

Sl. No.	Category	Course Code	Course	Contact Hrs. L-T-P	Credit	University Marks	Internal Evaluation
Subject (Theory)							
1	PC	CIPC3001	Design of RCC Structures	3-0-0	3	100	50
2	PC	CIPC3002	Transportation Engineering	3-0-0	3	100	50
3	PC	CIPC3003	Advanced Structural Analysis	3-0-0	3	100	50
4	PE	CIPE3001	Advanced Geotechnical Engineering	3-0-0	3	100	50
		CIPE3002	Ground Improvement				
		CIPE3003	Environmental Geotechnical Engineering				
		–	–				
		–	–				
		–	–				
		–	–				
5	HS	HSHS3001	Business Management	3-0-0	2	100	50
		HSHS3002	Entrepreneurship Development				
6	MC	MCMC3001	Environmental Engineering	3-0-0	2	100	50
		MCMC3002	Industrial Safety Engineering				
Subject (Sessional / Practical)							
7	PC	CIPC3201	Transportation Engineering Laboratory	0-0-3	1.5	–	100
8	PC	CIPC3202	Design of Concrete Structure	0-0-3	1.5	–	100
9	PC	CIPC3203	Transportation and Geotechnical Design	0-0-3	1.5	–	100
10	PSI	CIPS3201	Seminar on SIRE – I	0-0-3	1.5	–	100
			Total	**18-0-12**	**22**	**600**	**700**

Click here to view/download the syllabus of the subjects.

CIPC3001 DESIGN OF RCC CTSRUCTURES (3-0-0)

Course objectives

- To learn the basic concepts of designing reinforced concrete elements
- To design beam, slab, columns, staircase following the guidelines of relevant IS codes.
- To familiar with designing of footings and retaining walls.
- To able to design underground and elevated water tanks.

Module-I: **(08 Hrs.)**

Properties of concrete and reinforcing steel, philosophy, concept and methods of reinforced concrete design, introduction to limit state method, limit state of collapse and limit state of serviceability, application of limit state method to rectangular beams for flexure, shear, bond and torsion, Design of doubly reinforced beams, design of T and L beams.

Module-II: **(08 Hrs.)**

Design of one way and two way slabs, design of staircases, design of short and long columns with axial and eccentric loadings.

Module-III: **(08 Hrs.)**

Design of isolated and combined column footings, retaining walls, various forces acting on retaining wall, stability requirement, design of cantilever and counterfort retaining walls.

Module-IV: **(06 Hrs.)**

Design of water tanks, design requirements, design of tanks on ground, underground and elevated water tanks.

Course outcomes

After successfully studying this course, students will able to:

- Analyze RCC rectangular, flanged beams for bending, shear and torsion
- Design RCC slabs and columns following IS codes.
- Solve practical problems in designing retaining walls and footings
- Estimate the different parameters for construction of underground and elevated water tanks

Books:

- N. Subramanian, Design of Reinforced Concrete Structure, Oxford University Press Illustrated edition.
- A.K. Jain, Reinforced Concrete: Limit State Design, Pearson Education, Eighth edition.
- S.N. Sinha, Reinforced Concrete Design, McGraw Hill Education; Third edition
- S. U. Pillai & D. Menon Reinforced Concrete Design, McGraw Hill Education, Fourth edition
- N. K. Raju, Design of Reinforced Concrete Structures, CBS Publications, Fourth edition
- PC Verghese, Limit State Design of Reinforced Concrete, PHI Publications, Second Edition

CIPC3002 TRANSPORTATION ENGINEERING (3-0-0)

Course objectives

- To acquaint about different transportation systems and about their planning
- To conversant with road alignment and various parameters required for road geometric design
- To acquire knowledge on traffic studies of data collection procedures, analysis, control measures, capacity and service quality assessment
- To familiar with different types of material used for road construction and their quality assurance

Module-I: **(06 Hrs.)**

Course objectives

Transportation System, Modes of transportation – their importance & limitation, Historical Development of road construction. Highway Development & Planning in India: Classification of roads and road patterns, Highway alignment: Requirements, factors controlling alignment & Engineering surveys for Highway alignment.

Module-II: **(08 Hrs.)**

Geometric Design of Highways: Cross-sectional elements, Sight Distances, Horizontal alignments: Horizontal Curves, Super elevation design, Attainment of Super elevation, Radius of horizontal Curve, Extra Widening, Transition Curve and Setback Distance. Vertical alignments- Gradients, Types and Length of Vertical Curves, Grade Compensation on Horizontal Curve.

Module-III: **(08 Hrs.)**

Traffic Engineering: Traffic Studies- Volume studies, Speed Studies, OD Studies, Capacity Studies and Level of service, Peak hour factor, parking study, accident study and analysis, Statistical analysis of traffic data, Microscopic and macroscopic parameters of traffic flow, fundamental relationships, Operations and Traffic Control devices, Signal design by Webster's method. Types of intersections and channelization.

Module-IV: **(08 Hrs.)**

Highway Pavements materials: Aggregate - desirable properties & quality control tests of Aggregates, Bitumen- Types, Source, desirable properties & quality control tests of bitumen. CBR Test of Soil, Design of bituminous paving mixes by Marshall Method. Highway Pavement Design: Requirements, types & Design Factors. Design of flexible pavement using IRC: 37, Design of rigid pavements using IRC: 58, Stress analysis, Design of Joints in Rigid Pavement

Module-V: **(04 Hrs.)**

Economic aspects and analysis: Economic analysis- Depreciation methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis-Energy efficient motors

Computation of Economic aspects: Calculation of simple payback method, net present worth method-Power factor correction, lighting-Applications of life cycle costing analysis, return on investment.

Course Outcomes

After successfully studying this course, students will able to:

CO1: Understand the basic concept of road transport and road cross-sectional elements.

CO2: Carry out detailed studies on horizontal and vertical alignment geometric design of roadways

CO3: Understand basics of traffic engineering, estimate capacity and level of service of roadways and intersections

CO4: Apply the concept of testing on subgrade soil, road aggregates, and bitumen used for mix design and structural design of flexible pavement in the field.

Books:

- S. K. Khanna, C. E. G. Justo, A. Veeraragavan, Highway Engineering, Nem chand Bros, Roorkee, 10th edition, 2014.
- S.C. Saxena, Textbook of highway and traffic engineering, CBS Publication, 2020
- P. Chakraborty & A. Das, Principles of Transportation Engineering, PHI Publication, 2nd reprint 2005.
- L. R. Kadiyali, Traffic Engineering and Transport Planning, Khanna Publications, 7th edition, New Delhi, 2008.
- Karen K. Dixon Paul H. Wright, Highway Engineering, Wiley Publications, 7th edition,
- Yang H. Huang, Pavement Analysis and Design, Pearson, 2nd edition, 2008.

CIPC3003 ADVANCED STRUCTURAL ANALYSIS (3-0-0)

Course objectives

- To develop skills to idealize, formulate, and analyze determinate and indeterminate structures (beams, trusses, and frames) using classical and matrix structural analysis methods.
- To analyze practical problems related to usage of Two hinged arches and stiffening girders
- To acquire knowledge regarding concept of plastic analysis of structures
- To develop skills in interpreting and predicting solutions from structural analysis.

Module-I: (08 Hrs)

Introduction to Force and Displacement methods of structural analysis, Analysis of continuous beam and plane frame by slope deflection method, moment distribution method and Kani's method.

Module-II: (06 Hrs)

Two hinged arches and analysis of suspension cable with two hinged stiffening girders, Influence lines for indeterminate beams, influence lines for two hinged arches and stiffening girders. Analysis of fixed arches.

Module-III: (08 Hrs)

Plastic Analysis: Plastic modulus, shear factor, plastic moment of resistance, load factor, equilibrium/static method and kinematic/mechanism method, Simple cases of beams and frames (continuous beam and simple rectangular portals), Application of upper and lower bound theorems, Determining the collapse load using both theorems and the concept of mechanisms

Module-IV: (08 Hrs)

Matrix method of analysis: Development of Stiffness and Flexibility matrices for bars, trusses, plane frames, use of flexibility and stiffness method for analysis of trusses, beams and plane frames.

Course Outcomes:

After successfully studying this course, students will able to:

- Understand the basic concept of slope-deflection, slope deflection method, moment distribution method and Kani's method.
- Adopt the methods for analysis of two hinged arches, cables with stiffening girders
- Use the methods for analysis of indeterminate structures subjected to rolling or moving loads and their maximum influence on two hinged arches, cables with stiffening girders
- Understand plastic analysis of structures and design members based on it
- Apply the basic concepts of flexibility and stiffness matrix methods in structural analysis

Books:

- C. K. Wang, Intermediate Structural Analysis, McGraw Hill Education; first edition
- R C Hibbeler, Structural Analysis, Pearson Education, tenth edition
- C S Reddy, Basic Structural Analysis, McGraw Hill Education, third edition.
- S. S. Bhavikatti, Structural Analysis-II, Vikas Publishing, Fifth edition.
- G.S. Pandit & S. Gupta, Structural Analysis: A Matrix Approach, McGraw Hill Education; second edition
- V.K. Manicka Selvam, Fundamentals of Limit Analysis of Structures (A Course in Plastic Analysis of Structures), Dhanpat Rai Publications, second edition
- S. Kothandaraman & G. Vasudevan, Matrix Methods of Structural Analysis, Pearson Education, First edition
- S. Ramamrutham, Theory of Structures, Dhanpat Rai Publication, Ninth edition

CIPC3201 TRANSPORTATION ENGINEERING LABORATORY (0-0-3)

Course Objectives

- To assess the different properties of aggregates by performing various laboratory tests.
- To examine bitumen characteristics by conducting various laboratory tests.

Course Contents

1. (a) Determination of aggregate crushing value
   (b) Determination of Los Angeles abrasion value of aggregates
2. Determination of aggregate impact value of aggregates
3. (a) Determination of fineness modulus of coarse aggregates
   (b) Determination of fineness modulus of fine aggregates.
4. Determination of stripping value of aggregates
5. (a) Determination of bulking of sand.
   (b) Determination of workability of concrete.
   (c) Determination of flakiness index and elongation index of coarse aggregate
6. Determination of specific gravity and water absorption of coarse aggregates.
7. (a) Determination of penetration value of bitumen.
   (b) Determination of softening point value of bitumen.
8. (a) Determination of ductility value of bitumen.
   (b) Determination of flash and fire point of bitumen.
   (c) Determination of specific gravity of bitumen.
9. (a) Ageing of bituminous binders.
   (b) Marshall method of mix design.
10. Demonstration of advanced equipments for characterization of pavement materials.

Course Outcomes:

After successfully studying this course, students will able to:

- Gain practical experience in studying Highway Engineering parameters.
- Assess the quality of aggregates and bitumen.

Books

- S. K. Khanna & C E G Justo, Highway Engineering, Nemchand Bros, Roorkee, 8th edition.
- S. K. Duggal, Building Materials, New Age International Pvt. Ltd.

CIPC3203 TRANSPORTATION AND GEOTECHNICAL DESIGN LABORATORY (0-0-3)

Course Objectives

- To understand stability of slopes and examine various parameters influencing it
- To explore different highway geometric elements and pavement design methods
- To have knowledge related to earthwork calculation

1. Design of earthen slope
2. Landfill Design
3. Design of retaining walls and sheet piles
4. Design of shallow foundation
5. Design of deep foundation
6. Design of machine foundation
7. Geometrical design of Highway
8. Design of flexible and rigid pavements by IRC method
9. Orientation and geometrical design of Runway.
10. Turn out design.
11. Earthwork calculation.

Course Outcomes

After successfully studying this course, students will able to:

1. Use of stability analysis of slopes, pressure distribution diagram and bearing capacity of shallow foundation.
2. Design and analyses highway geometric elements & ability to design pavement.
3. Calculate cost of earthwork.

Books:

- S. K. Khanna & C E G Justo, Highway Engineering, Nemchand Bros, Roorkee, 8th edition.
- S. K. Duggal, Building Materials, New Age International Pvt. Ltd.
- V. N. S. Murthy, Principles of Soil Mechanics and Foundation Engg, UBSPD.
- I. H. Khan, A text book of Geo-technical Engg, Prentice Hall India.
- Venkatramaiah, Geotechnical Engineering, New Age International publishers.
- K. R. Arora, Soil Mechanics and Foundation Engineering, Standard Publisher

CIPE3001 ADVANCED GEOTECHNICAL ENGINEERING (3-0-0)

Course Objectives

- To equip students with fundamental and advanced knowledge in foundation engineering, enabling them to analyze and solve real-world geotechnical problems such as stress distribution in soils and consolidation behavior of soil.
- To develop the ability to apply engineering principles in the design of geotechnical systems, including shallow foundation, pile foundation, retaining structures, etc., while considering practical factors influencing soil behavior and load-bearing capacities.
- To enable students to assess and evaluate slope stability under various field conditions by applying appropriate analytical techniques, and to determine the factor of safety, ensuring the safe design of slopes in geotechnical engineering projects.

Module-I: (08 Hrs)
Stress distribution in soil: Boussinesq equations, Stress isobar and pressure bulb concept, pressure distribution on horizontal and vertical planes, stresses due to point load, line load, strip load, uniformly loaded circular and rectangular areas. Use of Newmark‘s chart. Westergaard‘s solution. Approximate methods (point load method, two-to-one load distribution method). Contact pressure distribution due to loaded areas. Concept of active zone.

Module-II (08 Hrs)
Shallow foundation: Introduction, bearing capacity, methods and determination of bearing capacity, settlement of foundations. Deep foundation: Classification of pile, pile driving methods, pile capacity (static and dynamic analysis) pile-group analysis, load test on piles.

Module-III (08 Hrs)
Subsoil exploration: Methods, direct (test pits, trenches), semi-direct (borings), indirect (sounding, penetration tests, and geophysical methods). Planning of exploration programme, spacing and depth of boring, soil sampling, types of samples, standard penetration test, static and dynamic cone penetration test, in-situ vane shear test. Seismic refraction method, electrical resistivity methods.

Module-IV (08 Hrs)
Lateral earth pressure and retaining structures: Earth pressure at rest, active and passive earth pressure. Earth pressure theories, Rankine‘s theory, Coloumb‘s wedge theory, Rebhann‘s and Culmann‘s graphical methods, stability conditions for retaining walls.

Course Outcomes:
After successfully studying this course, students will able to:

- Understand the basic concept of foundation engineering and determine the vertical stresses using various stress distribution theories to solve practical soil stress problems in geotechnical engineering subjected to various types of loading.
- Apply the concept of consolidation to carry out settlement analysis of real-world settlement problems in soils.
- Identify different types of shear failures, analyze the factors influencing bearing capacity, and determine the bearing capacity for various shallow foundation shapes like square, rectangular, and circular
- Analyze the factors influencing bearing capacity and calculate the load-carrying capacity of single pile and pile group.

Books:

- S. K. Gulhati and M. Datta, Geotechnical Engineering, McGraw Hill Company
- V. N. S. Murthy, Principles of Soil Mechanics and Foundation Engg, UBSPD.
- I. H. Khan, A text book of Geo-technical Engg, Prentice Hall India.
- B. C. Punmia, A text Book of Geo-technical Engg, Laxmi Publications.
- G. Ranjan& A. S. R. Rao, Basic and Applied Soil Mechanics, Wiley Eastern Ltd.
- K. R. Arora, Soil Mechanics and Foundation Engineering, Standard Publisher
- Venkatramaiah, Geotechnical Engineering, New Age International publishers.

CIPE3002 GROUND IMPROVEMENT (3-0-0)

Course Objectives :
The course aims to familiarize students with various ground improvement techniques essential for enhancing soil properties in challenging geotechnical conditions. It covers mechanical, chemical, hydraulic, thermal modifications, and the use of geosynthetics for soil reinforcement. Students will gain knowledge to analyze, evaluate, and design ground improvement solutions for real-world applications.

Module-I: (08 Hrs)
Introduction: situations where ground improvement becomes necessary, Mechanical modification: dynamic compaction, impact loading, compaction by blasting, vibro-compaction; pre-compression, stone columns;

Module-II: (06 Hrs)
Chemical modification; modification by admixtures, stabilization using industrial wastes, grouting

Module-III: (06 Hrs)
Hydraulic modification: dewatering systems, preloading and vertical drains, electro-kinetic dewatering, Thermal modification: ground freezing and thawing

Module-IV: (10 Hrs)
Soil reinforcement and Application of soil reinforcement: Reinforced earth, basic mechanism, type of reinforcements, selection of stabilization/improvement of ground using Geotextiles, Goegrid, geomembranes, geocells, geonets, and soil nails. shallow foundations on reinforced earth, design of reinforced earth retaining walls, reinforced earth embankments structures, wall with reinforced backfill, analysis and design of shallow foundations on reinforced earth, road designs with geosynthetics

Course Outcomes (CO):
CO1: Explain the necessity for ground improvement and describe the basic principles of various mechanical ground modification techniques such as dynamic compaction, vibro-compaction, and stone columns.
CO2: Apply appropriate chemical and hydraulic ground improvement methods, such as grouting and dewatering, to solve practical geotechnical problems.
CO3: Analyze ground behavior under thermal and electro-kinetic modification techniques and assess their feasibility for specific site conditions.
CO4: Evaluate and compare different soil reinforcement techniques using geosynthetics and determine the most suitable method for stabilization in varying geotechnical scenarios.
CO5: Design reinforced earth structures including embankments, retaining walls, and shallow foundations by integrating appropriate ground improvement and reinforcement methods.

Books:

- Hausmann, M.R., Engineering Principles of Ground Modification, McGraw-Hill International Editions, 1990.
- Yonekura, R., Terashi, M. and Shibazaki, M. (Eds.), Grouting and Deep Mixing, A.A. 4. Balkema, 1966.
- Moseley, M.P., Ground Improvement, Blackie Academic & Professional, 1993.
- Xanthakos, P.P., Abramson, L.W. and Bruce, D.A., Ground Control and Improvement, John Wiley & Sons, 1994.
- Koerner, R. M., Designing with Geosynthetics, Prentice Hall Inc. 1998.
- Shukla, S.K., Yin, Jian-Hua, ―Fundamentals of Geosynthetic Engineering‖, Taylor & Francis.

CIPE3003 ENVIRONMENTAL GEOTECHNICAL ENGINEERING (3-0-0)

Course Objectives:

1. To explore different sources of site contamination and their remedial measures
2. To understand basic principles of Solid and Hazardous Waste Management
3. To acquire knowledge regarding contaminant transport
4. To formulate strategies regarding management landfills and Ash Pond Dykes

Module-I: **(08 Hrs)**

Sources and Site Characterization: Scope of Environmental Geotechnics, Various Sources of Contaminations, Need for contaminated site characterization; and Characterization methods. Remediation Techniques: Objectives of site remediation, various active and passive methods, remediation NAPL sites, Emerging Remediation Technologies, Geosynthetics: Types, Functions and Design.

Module-II: **(08 Hrs)**

Solid and Hazardous Waste Management: Classification of waste, Characterization solid wastes, Environmental Concerns with waste, waste management strategies.

Module-III: **(06 Hrs)**

Contaminant Transport: Transport process, Mass-transfer process, Modeling, Bioremediation, Phytoremediation.

Module-IV: **(8 Hrs)**

Landfills: Types of landfills, Site Selection, Waste Containment Liners, Leachate collection system, Cover system, Gas collection system, Ash pond Dykes: Design

Course Outcomes:

After successfully studying this course, students will able to:

1. Suggest various remediation techniques for modification of contaminated sites
2. Determine the most appropriate technique for Solid and Hazardous Waste Management
3. Address the issues related to Contaminant Transport
4. Design landfills and Ash pond Dykes

Books:

- Phillip B. Bedient, Refai, H. S. & Newell C. J. - Ground Water Contamination - Prentice HallPublications, 4th Edition, 2008
- Sharma, H. D. and Reddy, K. R. - Geoenvironmental Engineering, John Wiley & Sons (2004)
- Rowe, R. K. - Geotechnical & Geoenvironmental Engineering Handbook, Kluwer Academic, 2001.
- Reddi, L. N. and Inyang, H. I. - Geoenvironmental Engineering Principles and Applications, Marcel. Dekker, Inc., New York, 2000.
- LaGrega, M. D., Buckingham, P. L. and Evans, J. C. - Hazardous Waste Management, New York: McGraw-Hill, 2001

HSHS3001 BUSINESS MANAGEMENT (3-0-0)

Course Objectives

By the end of this course, students will be able to:

- Understand fundamental management principles
- Learn project management techniques and its application
- Understand the financial aspects of engineering decisions
- Demonstrate leadership, communication, and team management skills
- Understand the basics of entrepreneurship and innovation management

Module-I: Management Foundations and Organizational Dynamics

Introduction to Management: Functions of Management; Evolution of management thought and its relevance to engineering; Management vs. Leadership: Key distinctions; Decision-making processes; Organizational design and structure; Team dynamics and group behaviour; Motivation theories and their application to technical teams; Organizational Communication; Cultural considerations in global business environment

Module-II: Project Management and Financial Decision Making

Project lifecycle and phases; Work breakdown structure and scheduling; Resource allocation and budgeting; Risk management in engineering projects; Quality management and control; Basic financial statements and their interpretation; Time value of money; Budgeting and cost control; Return on investment (ROI) and net present value (NPV); Funding sources for engineering projects; Cost-benefit analysis for technical decisions

Module-III: Leadership, Innovation and Entrepreneurship

Leadership styles and their effectiveness; Managing technical teams and professionals; Performance management and feedback; Recruitment and selection in engineering roles; Training and development of technical staff; Ethical leadership in engineering; Innovation management; Technology transfer and commercialization; Startup fundamentals; Intellectual property basics; Business model development

Course Outcomes

CO1: Recall fundamental management principles, organizational theories, and project management methodologies, key financial concepts used in engineering decision-making.

CO2: Explain the relationship between management functions (planning, organizing, leading, controlling) and their application.

CO3: Demonstrate project management skills and apply financial analysis techniques for decision making.

CO4: Analyse organizational behaviour patterns, team dynamics, and performance issues in engineering management contexts.

CO5: Judge ethical implications of management decisions and leadership actions in professional engineering practice.

CO6: Create integrated management solutions for solving complex business problems.

Reference Books:

1. Management Theory and Practice" by C.B. Gupta
2. Essentials of Management" by Koontz, Weihrich, and Aryasri (Indian Edition)
3. Project Management for Engineering and Technology" by N.K. Sharma
4. Financial Management: Theory and Practice" by Prasanna Chandra
5. Organizational Behaviour" by Aswathappa K.
6. Human Resource Management" by V.S.P. Rao
7. Entrepreneurship Development" by S.S. Khanka
8. Operations Management" by R. Panneerselvam

HSHS3002 ENTREPRENEURSHIP DEVELOPMENT (3-0-0)

Course Objectives –

1. To explain concept of entrepreneurship and build and understanding about business situation in which entrepreneurs act.
2. To explain classification and type of entrepreneurs and the process of entrepreneurial project development
3. To discuss the steps in venture development and new trends in entrepreneurship.
4. The more focus is given on creativity and innovation.

Module-I: (10 hours)

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneurs, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

Module-II: (08 hours)

Entrepreneurial Environment, Identification of Opportunities, Converting Business Opportunities into reality. Start-ups and business incubation, Setting up a Small Enterprise. Issues relating to location, Environmental Problems and Environmental pollution Act, Industrial Policies and Regulations

Module-III: (10 hours)

Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

Module-IV: (12 hours)

Sickness of Small-Scale Industries, Causes and symptoms of sickness, cures of sickness, Role of Banks and Governments in reviving industries.

Course Outcomes

After completion of this course, students

CO1: will aware about foundation of entrepreneurship development and its theories
CO2: will identify the type of entrepreneur and the steps involved in a entrepreneurial venture.
CO3: will understand various steps involved in starting a venture and to explore marketing methods & new trends in entrepreneurship.
CO4: Think creative and innovative

Books:

1. Entrepreneurship Development and Management, Vasant Desai, HPH
2. Entrepreneurship Management, Bholanath Dutta, Excel Books
3. Entrepreneurial Development, Sangeeta Sharma, PHI
4. Entrepreneurship, Rajeev Roy, Oxford University Press

MCMC3001 ENVIRONMENTAL ENGINEERING (3-0-0)

Course Objectives:

- To acquire basic knowledge of source of water and various treatment processes
- To determine the sewage quantity, and understand its treatment and disposal
- To Identify and value the effect of the pollutants in atmosphere
- To formulate strategies to solid waste management

Module-I: (08 Hrs)

Water: Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs and design. Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes.

Module-II: (08 Hrs)

Sewage- Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage-Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems, Storm Water- Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans, Wastewater treatment, aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – quality requirements for various purposes.

Module-III: (08 Hrs)

Air - Composition and properties of air, Quantification of air pollutants, monitoring of air pollutants, Air pollution-Occupational hazards, Urban air pollution automobile pollution, Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship. Air quality standards, Control measures for Air pollution, construction and limitations

Module-IV: (08 Hrs)

Noise-Basic concept, measurement and various control methods. Solid waste Management-Municipal solid waste, Composition and various chemical and physical parameters of MSW, MSW management: Collection, transport, treatment and disposal of MSW. Special MSW: waste from commercial establishments and other urban areas, solid waste from construction activities, biomedical wastes, Effects of solid waste on environment: effects on air, soil, water surface and ground health hazards. Disposal of solid waste-segregation, reduction at source, recovery and recycle. Disposal methods- Integrated solid waste management. Hazardous waste: Types and nature of hazardous waste as per the HW Schedules of regulating authorities.

Course Outcomes:

After successfully studying this course, students will able to:

- Understand the impact of humans on environment and environment on humans
- Identify and value the effect of the pollutants on the environment: atmosphere, water and soil
- Formulate strategies to control, reduce and monitor pollution
- Determine the most appropriate technique for the treatment of water, wastewater solid waste and contaminated air

Books

- Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
- Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.
- Peavy, H.s, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw -Hill International Editions, New York 1985.
- MetCalf and Eddy. Wastewater Engineering, Treatment, Disposal and Reuse, Tata McGraw-Hill, New Delhi

MCMC3002 INDUSTRIAL SAFETY ENGINEERING (3-0-0)

Course Objectives:

1. Students will be able to recognize and evaluate occupational safety and health hazards in the workplace, and to determine appropriate hazard controls following the hierarchy of controls.
2. Students will furthermore be able to analyze the effects of workplace exposures, injuries and illnesses, fatalities and the methods to prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.

Course Outcomes:

By the end of this course, a student should:

CO1: Evaluate workplace to determine the existence of occupational safety and health hazards
CO2: Identify relevant regulatory and national consensus standards along with best practices that are applicable.
CO3: Select appropriate control methodologies based on the hierarchy of controls
CO4: Analyze injury and illness data for trends

Module-I: (07 hrs)

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Module-II: (07 hrs)

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Module-III: (07 hrs)

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Module-IV: (07 hrs)

Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault-finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Module-V: (08 hrs)

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance.

Books:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, McGraw Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

BIJUPATNAIKUNIVERSITY OF TECHNOLOGY, ODISHA

ROURKELA

Curriculum and Syllabus

B. Tech (*Civil Engineering)* from the Admission Batch 2018-19

Semester (6th)

Sixth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Evaluation**
1	PC		Design of Steel Structures	3-0-0	3	100	50
2	PC		Hydrology &Irrigation Engineering	3-0-0	3	100	50
3	BS		Optimization in Engineering	3-0-0	3	100	50
4	PE		Foundation Engineering	3-0-0	3	100	50
			Ground Improvement Techniques.	3-0-0			
			Environmental Geo Techniques	3-0-0			
5	OE		Human Resources Management	3-0-0	3	100	50
			Artificial Intelligence and Machine Learning	3-0-0			
			Renewable Power Generation Systems	3-0-0			
6	MC*	RIK6F001	Essence of Indian Knowledge Tradition-1	3-0-0	0	-	100 (Pass mark is 37)
Total Credit (Theory)					**15**		
Total Marks						**500**	**250**
Practical							
1	PC		Steel Structures Lab	0-0-3	2		100
2	PC		Irrigation Engineering Lab	0-0-3	2		100
3	PSI		Future Ready Contributor Develop Model Lab	0-0-3	2		100
4	PSI		Seminar - I	0-0-3	1		100
Total Credit (Practical)					**7**		
Total Semester Credit					**22**		
Total Marks							**400**
SUMMER INTERNSHIP TRAINING FOR 45 DAYS							

***Mandatory Non-Credit Courses (MC) result will be reflected with Pass (P) / Fail (F) grade. Thus the grade obtained will not be affecting the grade point average. However it shall appear on the grade sheet as per AICTE rule.**

6th Semester	RCI6C001	Design of Steel Structures	L-T-P 3-0-0	3 Credits

Module I **10 HOURS**

Introduction, advantages/disadvantages of steel, structural steel, rolled steel section, various types of loads, design philosophy.

Limit state design method, limit states of strength and serviceability, probabilistic basis for design Riveted, bolted and pinned connections,

Welded connections-assumptions, types, design of fillet welds, intermittent fillet weld, plug and slot weld, failure of welded joints, welded joints vs bolted and riveted joints

Module II **6 HOURS**

Tension members, types, net cross-sectional area, types of failure, slenderness ratio, design of tension members, gusset plate.

Module III **6HOURS**

Compression members, effective length, slenderness ratio, types of cross-section, classification of cross section,

Design of axially loaded compression members, lacing, battening, design of column bases, and foundation bolts.

Module IV **8 HOURS**

Design of beams, types of c/s, lateral stability of beams, lateral torsional buckling, bending and shear strength, web buckling and web crippling, deflection, design procedure.

Module V **6HOURS**

Plate girders- various elements and design of components Eccentric and moment connections, roof trusses

Books:

1. Design of Steel Structures- Limit State Method by N. Subramanian, Oxford University Press
2. Limit State Design of Steel structures by S.K. Duggal, Mc-Graw Hill
3. Design of steel structures by S.S.Bhavikatti, I.K. International Publishing house.
4. Design of Steel Structures by K. S. Sairam, Pearson
5. Steel Design by William T. Segui, Cengage Learning
6. Fundamentals of Structural Steel Design by M.L.Gambhir, Mc Graw Hill
7. Steel Structures-Design and Practice by N. Subramanian, Oxford University Press

Books:

Digital Learning Resources:

Course Name	Design of Steel Structure
Course Link	https://nptel.ac.in/courses/105/105/105105162/
Course Instructor	PROF. DAMODAR MAITY

6th Semester	RCI6C002	Hydrology&Irrigation Engineering	L-T-P 3-0-0	3 Credits

MODULE-I **09HOURS**

Hydrologic cycle, World water balance; Forms, types & measurement of precipitation; Mean precipitation over an area; Curves of precipitation: Depth-area-duration, Intensity-duration-frequency & Depth-duration-frequency; Probable maximum precipitation; World's greatest observed rainfalls; Abstractions of precipitation: Measurement of evaporation; Evapotranspiration & its equations; Infiltration: measurement & indices.

MODULE-II **09HOURS**

Major methods for Measurement of stage, velocity & streamflow; Stage-discharge relationship: linear & log-log; Runoff characteristics of streams; Runoff volume estimation by Curve Number method; Flow mass curve & reservoir capacity estimation; Hydrographs: components, affecting factors & base flow separation methods; Unit hydrographs (UHs): derivation, use & limitations; UHs of different durations; Peak flood estimation by Rational method, empirical formulae, enveloping curves & Gumbel's Method.

MODULE-III **09HOURS**

Irrigation: necessity, advantages & disadvantages; Water distribution techniques in farms: free flooding, border flooding, check flooding, basin flooding, furrow irrigation, sprinkler irrigation & drip irrigation; Crop water requirement: duty, delta, base period & crop period; Irrigation efficiencies; Soil moisture - irrigation frequency relationship; Irrigation channels: classification & alignment; Distribution system, water losses in irrigation channels; Stable & regime channel design: comparison of Kennedy's & Lacey's Theories; Irrigation canal lining: types, advantages, economics & preliminary design.

MODULE-IV **09HOURS**

Types of Cross-Drainage (CD) Works, , Design considerations for CD works; Diversion Head works: Types of weirs and barrages, Layout of a diversion head works; Design of weirs and barrages: Comparison among Bligh's creep theory, Lane's weighted creep theory and Khosla's method of independent variables, Exit gradient; Canal Falls: Necessity, Proper location, Types,Gravity Dams: Typical cross section, Various forces acting on gravity dam, Combination of forces for design, Modes of failure and criteria for structural stability, High and low gravity dams, Typical section of low gravity dam; Earth Dams: Types, Causes of failure, Preliminary section, Seepage control. Spillways: Brief study of various types.

Books:

1. Irrigation Engineering and Hydraulic Structures by S. K. Garg, Khanna Publication, New Delhi
2. Irrigation Engg. By B.C. Punmia and Pande, Laxmi Publication, New Delhi
3. Engineering Hydrology by K Subramanya, McGraw Hill Education, New Delhi
4. Hydrology Principles Analysis Design by H M Raghunath, New Age International Publishers, New Delhi

Digital Learning Resources:

Course Name	IRRIGATION AND DRAINAGE
Course Link	https://nptel.ac.in/courses/126/105/126105010/
Course Instructor	PROF. DAMODHARA RAO MAILAPALLI Department of Agricultural and Food Engineering IIT Kharag

6th Semester		Optimization in Engineering	L-T-P 3-0-0	3 Credits

Module I: **(10 Hours)**

Idea of Engineering optimization problems, Classification of optimizationalgorithms, modeling of problems and principle of modeling. Linear Programming:Formulation of LPP, Graphical solution, Simplex method, Big-M method, Revised simplex method, Duality theory and its application, Dual simplex method , Sensitivity analysis in linear programming.

Module II: **(10 Hours)**

Transportation problems:Finding an initial basic feasible solution by NorthwestCorner rule, Least Cost rule, Vogel's approximation method, Degeneracy, Optimalitytest, MODI method, Stepping stone method. **Assignment problems:** Hungarian method for solution of Assignment problems. Integer Programming: Branch and Bound algorithm for solution of integer programming problems.

Module III: **(12 Hours)**

Non-linear programming: Introduction to non-linear programming. Unconstraintoptimization: Fibonacci and Golden Section Search method. Constrained optimization with equality constraint: Lagrange multiplier, Projected gradient method. Constrained optimization with inequality constraint: Kuhn-Tucker condition, Quadratic programming.

Module IV: **(6 Hours)**

Queuing models: General characteristics, Markovian queuing model, M/M/1model, Limited queue capacity, multiple server, Finite sources, Queue discipline.

Books:

[1] Operations Research- Principle and Practice, A. Ravindran, D. T. Philips, J. Solberg, Second edition, Wiley India Pvt Ltd.
[2] Operation Research, Prabhakar Pai ,Oxford University Press
[3] Optimization for Engineering Design, Kalyanmoy Deb, PHI Learning Pvt Ltd.
[4] Operations Research, H.A.Taha, A.M.Natarajan, P.Balasubramanie, A.Tamilarasi, Pearson Education, Eighth Edition.
[5] Engineering Optimization, S S Rao, New Age International Pvt Ltd, 2003.
[6] Linear and Non-linear Optimization, **S**tephen G. Nash, A. Sofer, McGraw Hill, 2nd Edition.
[7] Engineering Optimization, A.Ravindran, K.M.Ragsdell, G.V.Reklaitis, Wiley India Pvt. Ltd, Second edition.
[8] Operations Research, F.S.Hiller, G.J.Lieberman, Tata McGraw Hill, Eighth Edition, 2005.
[9] Operations Research, P.K.Gupta, D.S.Hira, S.Chand and Company Ltd, 2014.

Digital Learning Resources:

Course Name	CONSTRAINED AND UNCONSTRAINED OPTIMIZATION
Course Link	https://nptel.ac.in/courses/111/105/111105100/
Course Instructor	PROF. ADRIJIT GOSWAMI, PROF. DEBJANI CHAKRABORTY Department of Mathematics IIT Kharagpur

6th Semester	RCI6D001	Foundation Engineering	L-T-P 3-0-0	3 Credits

Foundation Engineering **8 HOURS**

Module:I

Lateral Earth Pressure and Retaining Structures: Concept of earth pressure, Earth pressure at rest,active and passive earth pressure for both cohesionless and cohesive soils, Earth pressure theories:Rankine's theory, Coulomb's Wedge theory, Graphical methods: Rebhan's and Culmann's graphicalsolutions, Stability conditions for retaining walls.

Module: II **10HOURS**

Bearing Capacity: Definitions, Rankine's analysis, Types of failures: General and local shear failure,Terzaghi's Analysis, Brinch-Hansen analysis, Meyerhof's analysis, Vesics's bearing capacityequation, Effect of water table on bearing capacity, IS code method for computing bearing capacity,

Field Methods: Plate load test and its limitations, Standard penetration test.

Shallow Foundations: Types of foundations: Spread footing, combined and strap footing, mat or raftfooting, Settlement of footings.

Module: III **10HOURS**

Deep Foundations: Difference between shallow and deep foundations, Types of deep foundations.

Pile Foundations: Types of piles, pile driving, load carrying capacity of piles-static and dynamic formulae, Pile load test and its limitations, correlation with penetration tests, Group action in pilessettlementand efficiency of pile groups in clay, negative skin friction, Under reamed pile foundation. Basics of well foundation - types, component parts and ideas about the forces acting on a well foundation.

Module: IV **8 HOURS**

Subsoil Exploration: Necessity and planning for subsoil exploration, Methods - direct (test pits and trenches), indirect (sounding, penetration tests and geophysical methods).

Soil sampling – types of samples, standard penetration test, static and dynamic cone penetration test, in-situ vane shear test, Rock coring, soil exploration report.

Books:

1. Principles of Foundation Engineering by B. M. Das, Cenage Learning
2. Basic and Applied Soil Mechanics by Gopal Ranjan and A. S. R. Rao, New Age International Publishers
3. Geotechnical Engineering by C. Venkatramiah, New Age International Publishers
4. Geotechnical Engineering by S. K. Gulati & Manoj Gupta, Mc Graw Hill
5. Soil Mechanics and Foundations by B. C. Punmia et al., Laxmi Publications
6. Soil Mechanics & Foundation Engineering by B.N.D. Narasinga Rao, Wiley

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Digital Learning Resources:

Course Name	FOUNDATION ENGINEERING
Course Link	https://nptel.ac.in/courses/105/105/105105176/
Course Instructor	PROF. KOUSIK DEB Department of Civil Engineering IIT Kharagpur

6th Semester	RCI6D002	Ground Improvement Techniques.	L-T-P 3-0-0	3 Credits

Module – I **8 HOURS**

Introduction, Necessity of ground improvement, selection of ground improvement techniques, stabilization ofexpansive soil.

Module-II **8 HOURS**

Dewatering, Well points-Vacuum / electro osmotic methods, Analysis of seepage, Two Dimensional Flow, heattreatment, ground freezing., Analysis and design of dewatering systems.

Grouting types, Properties, Method of grouting, Ground selection and control.

Module – III **8 HOURS**

Compaction, Methods of compaction, Engineering properties of compacted soil, Field compaction and its control. dynamic compaction, Vibro flotation, Compaction piles, Consolidation, Sand drains, Preloading, Stone columns, Construction methods, Merits and demerits of various techniques

Module – IV **6 HOURS**

Soil stabilization, Use of chemical additives,

Module – V **6 HOURS**

Reinforced earth, Concept, Materials, Application and design, Use of geo-synthetics and geo-cells in construction work.

Books:

1.Grond improvement techniques by P.P.Raj, Laxmi Publications.
2.Foundation Design and Construction, M.J. Tomlinson
3. Foundation Engineering, G.A. Leonard, Tata McGraw Hill
4. Modern Geotechnical Engineering, Alam Singh, IBT Publishers
5.GeotechnicalEngineering.ShashKGulati&ManojDatta,TataMc-GrawHill

Digital Learning Resources:

Course Name	Ground Improvement Techniques - Video course
Course Link	https://nptel.ac.in/courses/105/108/105108075/
Course Instructor	Dr. G.L. Sivakumar Babu Department of Civil Engineering, IISc Bangalore

6th Semester	RCI6D003	Environmental Geo Techniques	L-T-P 3-0-0	3 Credits

Module- I **8 HOURS**

Introduction: Scope, importance, waste generation, subsurface contamination, Geosynthetics: Types, functions, applications.

Module- II **8 HOURS**

Forms of waste and their properties: Municipal waste, mineral waste, industrial waste, hazardous waste, index properties, strength, compressibility and permeability of municipal and mineral waste.

Module- III **8 HOURS**

Selection of waste disposal sites, factors affecting site selection, Landfills for municipal and hazardous waste: components of landfills, layouts, dailycells, base lining systems.

Module- IV **6HOURS**

Ash ponds and mine tailing impoundments: slurry deposition of mine tailing and coal ash in impoundments, layouts, components, design of tailing dam/ash dykes.

Module- V **6HOURS**

Remediation: Principle of remediation: Planning, source control, soil gas extraction, soil washing, and bio-remediation.

Books:

1. Geotechnology of waste management, I. S. Oweis and R. P. Khera, Butterwarths, London.
2. Engineering with geosynthetics, Ed. G. V. Rao and G.V.S.S. Raju, Tata McGraw Hill
3. Geotechnical practice for waste disposal, D. E. Daniel, Chapman and Hall, London.

Digital Learning Resources:

Course Name	ENVIRONMENTAL GEOTECHNICS
Course Link	https://nptel.ac.in/courses/105/101/105101196/
Course Instructor	PROF. D. N. SINGH, Department of Civil Engineering, IIT Bombay

6th Semester		Human Resources Management	L-T-P 3-0-0	3 Credits

Module I: **8 HOURS**

Concept scope and objectives of HRM. Relationship between HRM and HRD. The challengesfor HRM – Environmental, organizational and Individual. Role and functions of HR managers inthe changing business scenario. Human Resources Planning – overview, Recruitment – concept,objectives, legal framework regulating recruitment in India, Selection – Objectives and methods,Test and interviews, Induction and orientation, validity and reliability of Tests and interviews.

Module II: **8 HOURS**

Career Planning – concept, objectives. Different stages of career and its implications, Methods ofcareer planning and development, Promotion – types and process, Transfer – types. Separationsincluding lay off and retrenchment. Performance Management – concept and objectives.

Module III: **6 HOURS**

Performance Appraisal – concept objectives and methods – management by objectives (MBO),Assessment centre, 360 degree feedback. Appraisal errors. Competency mapping – concept,objectives and the process.

Module IV: **8 HOURS**

Compensation Management – objectives and principles. wage & salary. Wage concept – minimum wage, Fair wage, living wage. nominal wage and real wage. Components of wages, methods of wage determination, job evaluation – methods wage differentials and its functions.

Module V: **6 HOURS**

Training and Development – Training need Assessment, Types of Training Programs – on the job and off the job training programs, Evaluation of effectiveness of training programs.

Books

1. Personnel & HRM – P. subha Rao, Himalaya Publishing House.
2. HRM - Text and cases – Aswathappa, THM
3. Managing Human Resources – Gomez, Belkin &Cardy, PHI. HRM – Snell, Bohlander, Vohra – Cengage Publication

Digital Learning Resources:

Course Name	PRINCIPLES OF HUMAN RESOURCE MANAGEMENT
Course Link	https://nptel.ac.in/courses/110/105/110105069/
Course Instructor	PROF. ARADHNA MALIK, Department of Management Studies, IIT KGP

6th Semester		Artificial Intelligence and Machine Learning	L-T-P 3-0-0	3 Credits

Module-I: **(12 hours)**

INTRODUCTION –The Foundations of Artificial Intelligence; - INTELLIGENT AGENTS – Agents and Environments, Good Behaviour: The Concept of Rationality, the Nature of Environments, the Structure of Agents, SOLVING PROBLEMS BY SEARCH – Problem-Solving Agents, Formulating problems, Searching for Solutions, Uninformed Search Strategies, Breadth-first search, Depth-first search, Searching with Partial Information, Informed (Heuristic) Search Strategies, Greedy best-first search, A* Search, CSP, Means-End-Analysis.

Module-II: **(12 hours)**

ADVERSARIAL SEARCH – Games, The Mini-Max algorithm, optimal decisions in multiplayer games, Alpha-Beta Pruning, Evaluation functions, Cutting off search, LOGICAL AGENTS – Knowledge-Based agents, Logic, Propositional Logic, Reasoning Patterns in Propositional Logic, Resolution, Forward and Backward chaining - FIRST ORDER LOGIC – Syntax and Semantics of First-Order Logic, Using First-Order Logic , Knowledge Engineering in First-Order Logic - INFERENCE IN FIRST ORDER LOGIC – Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution

Module-III: **(6 hours)**

UNCERTAINTY – Acting under Uncertainty, Basic Probability Notation, The Axioms of Probability, Inference Using Full Joint Distributions, Independence, Bayes' Rule and its Use, PROBABILISTIC REASONING – Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distribution, Exact Inference in Bayesian Networks, Approximate Inference in Bayesian Networks

Module-IV: **(10 hours)**

LEARNING METHODS – Statistical Learning, Learning with Complete Data, Learning with Hidden Variables, Rote Learning, Learning by Taking Advice, Learning in Problem-solving, learningfrom Examples: Induction, Explanation-based Learning, Discovery, Analogy, FormalLearning Theory, Neural Net Learning and Genetic Learning. Expert Systems: Representingand Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition.

Books:

[1] Elaine Rich, Kevin Knight, & Shivashankar B Nair, Artificial Intelligence, McGraw Hill,3rd ed.,2009

[2] Stuart Russell, Peter Norvig, *Artificial Intelligence -A Modern Approach*, 2/e, Pearson, 2003.

[3] Nils J Nilsson, *Artificial Intelligence: A New Synthesis*, Morgan Kaufmann Publications,2000

[4] Introduction to Artificial Intelligence & Expert Systems, Dan W Patterson, PHI.,2010

[5] S Kaushik, Artificial Intelligence, Cengage Learning, 1st ed.2011

Digital Learning Resources:

Course Name: Artificial Intelligence Search Methods For Problem Solving
Course Link: https://swayam.gov.in/nd1_noc20_cs81/preview
Course Instructor: Prof. D. Khemani, IIT Madras

Fundamentals of Artificial Intelligence

Course Name:
Course Link: https://swayam.gov.in/nd1_noc20_me88/preview
Course Instructor: Prof. S. M. Hazarika, IIT Guwahati

Course Name: Introduction to Machine Learning
Course Link: https://nptel.ac.in/courses/106/105/106105152
Course Instructor: Prof. S. Sarkar, IIT Kharagpur

Course Name: Machine Learning
Course Link: https://nptel.ac.in/courses/106/106/106106202
Course Instructor: Prof. Carl Gustaf Jansson, IIT Madras

6th Semester		Renewable Power Generation Systems	L-T-P 3-0-0	3 Credits

Module I: **(15 Hours)**

Introduction: Conventional energy Sources and its Impacts, Non conventional energy– seasonalvariations and availability, Renewable energy – sources and features, Distributed energy systemsand dispersed generation (DG). Solar Energy: Solar processes and spectral composition of solar radiation. Solar Thermal system-Solar collectors, Types and performance characteristics, Applications-Solar water heating systems(active & passive) , Solar space heating & cooling systems , Solar desalination systems, Solar cooker.Solar photovoltaic system-Operating principle, Photovoltaic cell concepts, Cell, module, array,Losses in Solar Cell, Effects of Shadowing-Partial and Complete Shadowing, Series and parallelconnections, Cell mismatching, Maximum power point tracking, Applications-Battery charging,Pumping, Lighting, Peltier cooling. Modelling of PV cell.

Module II: **(10 Hours)**

Wind Energy: Wind energy, Wind energy conversion; Wind power density, efficiency limit for windenergy conversion, types of converters, aerodynamics of wind rotors, power ~ speed and torque speed characteristics of wind turbines, wind turbine control systems; conversion to electricalpower: induction and synchronous generators, grid connected and self excited induction generatoroperation, constant voltage and constant frequency generation with power electronic controlsingle and double output systems, reactive power compensation, Characteristics of wind powerplant, Concept of DFIG.

Module III: **(9 Hours)**

Biomass Power: Principles of biomass conversion, Combustion and fermentation, Anaerobic digestion, Types of biogas digester, Wood gassifier, Pyrolysis, Applications. Bio gas, Wood stoves,Bio diesel, Combustion engine, Application.

Module IV: **(6 Hours)**

Hybrid Systems: Need for Hybrid Systems, Range and type of Hybrid systems, Case studies ofDiesel-PV, Wind-PV, Microhydel-PV, Biomass-Diesel systems, electric and hybrid electric vehicles.

Books:

[1] Godfrey Boyle"Renewable Energy- Power for a Sustainable Future",Oxford University Press.

[2] B.H.Khan, "Non-Conventional Energy Resources",TataMcGrawHill, 2009.

[3] S. N. Bhadra, D. Kastha, S. Banerjee, "Wind Electrical Systems",Oxford University Press, 2005.

[4] S. A. Abbasi, N. Abbasi, "Renewable Energy Sources and Their Environmental Impact", Prentice Hall of India, New Delhi, 2006

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Digital Learning Resources:

Course Name:	Energy Resources and Technology
Course Link:	https://nptel.ac.in/courses/108/105/108105058/
Course Instructor:	Prof. S Banerjee, IIT Kharagpur

6th Semester	RIK6F001	Essence of Indian Knowledge Tradition-1	L-T-P 3-0-0	0 Credits

Course Objective:

The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature.Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions. The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system.

Course Outcomes:

- Ability to understand, connect up and explain basics of Indian Traditional knowledge modern scientific perspective.

Course Content:

- Basic Structure of Indian Knowledge System (i) वेद, (ii) उपवेद (आयुर्वेद, धनुर्वेद, गन्धर्वेद, स्थापत्य आदि) (iii) वेदांग (शिक्षा, कल्प, निरुत, व्याकरण, ज्योतिष छंद), (iv) उपाङ्ग (धर्म शास्त्र, मीमांसा, पुराण, तर्कशास्त्र)
- Modern Science and Indian Knowledge System
- Yoga and Holistic Health care
- Case Studies.

Books:

1. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan
3. Fritzof Capra, Tao of Physics
4. Fritzof Capra, The wave of Life
5. V N Jha (Eng. Trans,), Tarkasangraha of Annam Bhatta, Inernational Chinmay Foundation, Velliarnad, Amaku,am
6. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta
7. GN Jha (Eng. Trans.) Ed. R N Jha, Yoga-darshanam with Vyasa Bhashya, VidyanidhiPrakasham, Delhi, 2016
8. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, VidyanidhiPrakasham, Delhi, 2016 9. P R Sharma (English translation), ShodashangHridayam

6th Semester	**RCI6C201**	**Steel Structures Lab**	**L-T-P 0-0-3**	**2 Credits**

1. Design and detailing of steel roof trusses/ industrial buildings
2. Design of columns(with lacing and battening) and column bases
3. Design of plate girders and gantry girder
4. Detailing of structural steel connections, seated and framed connections

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Course Name	Design of Steel Structure	
Course Link	https://nptel.ac.in/courses/105/105/105105162/	
Course Instructor	PROF. DAMODAR MAITY	

6th Semester	RCI6C202	Irrigation Engineering Lab	L-T-P 0-0-3	2 Credits

Design of Irrigation Structure (Sessional/Practical) (0-0-3)
Course Objectives:
Gaining knowledge regarding design of various hydraulic structures and Irrigation systems.
Course Content:
1. Canal design:
a.Canal Dimension study
b.Canal Fall: Design of any one fall.

2. Land drainage: Depth and spacing of Tile drains.

3. Design of Cross Drainage Works

4. Gravity Dam Design
a.Profile of the dam, Forces on Dam, Safety of Dam
b.Shear stress, Principal Stress on Dam

5. Earthen Dam:
a.Seepage line determination
b.Slope stability design

6. Design and detailing of any one type of fall.

7. Spillway: design of any one type of spillway

Books:
1. S.K. Garg, Irrigation Engineering and Hydraulic Structure , Khanna publisher.

2. J.K.Sharma and Laxmi Narain, Analysis and Design of Hydraulic Structures, Krishna Prakashan Media.
3. Dr. V.C. Agarwal, Irrigation Engineering And Hydraulic Structures, S.K. Kataria& Sons

Digital Learning Resources:

Course Name	IRRIGATION AND DRAINAGE
Course Link	https://nptel.ac.in/courses/126/105/126105010/
Course Instructor	PROF. DAMODHARA RAO MAILAPALLI Department of Agricultural and Food Engineering IIT Kharag

6th Semester		Future Ready Contributor Program	L-T-P 0-0-3	2 Credits

Outcomes: The Future-ready Contributor Program aims to accomplish the following outcomes in the lives of students–

- Improve the employability of students by giving them the right work ethic and thinking that employers are looking for.
- Build their confidence with which they can go into any job and contribute meaningfully.
- Improve their ability to engage better in the workplace and to be able to handle the challenges that come up there.
- Build their career-worthiness and help them develop into future-ready contributors with ability to navigate a career in a volatile, changing world.
- Widen their choices of career and success, so that they are able to open up more opportunities for themselves and take up unconventional career pathways.
- Enable them recognize how they as technical professionals, can participate and make a positive contribution to their communities and to their state.

The Program content is also designed to expose students to real-world workplace scenarios and sensitize them to some of the challenges faced in society around them, especially in the local communities around them and in their own state of Odisha.

The Contributor Program syllabus has been evolved and fine-tuned over several years, to –

a) address the changing need and contemporary challenges being faced by industry and what employers of today are looking for in the people they hire;
b) working extensively with universities and students and an appreciation of their challenges and concerns;
c) guided by the higher ideas and principles of practical Vedanta in work.

Sr. No.		Content	Total Hrs
1	**Part 1 : Developing self-efficacy and basic inner strength**	**Who is a Future-ready Contributor?** *In this topic, students understand the new work environment, expectations from future workforce, and importance of being a future-ready contributor. This enables students to transform their expectation of themselves in work*	3 hrs lab sessions (discovery-based facilitator led)
2		**Self-esteem & Growth Identity** *In this topic, students learn how to develop a deeper and more resilient self esteem and how to adopt a growth identity/ mindset, that is more appropriate to the demands of the future workplace.*	Same as above
3		**Become a Creator of one's destiny** *In a "victim stance", we see the career environment as full of difficulties and hurdles. We feel powerless or blame our circumstances for not having many opportunities. This makes us fearful of uncertainty and makes us settle for jobs where we remain mediocre. In this topic, students discover the "creator of destiny stance" to challenges and situations. This stance helps them take ownership & responsibility to shape destiny, build a new future & find answers to challenges; and stop being complainers.*	Same as above
4	**Part 2 : Building ability to make more effective career choices**	**Achieving Sustainable Success** *In this topic, students discover how to achieve sustainable or lasting success, by making themselves success-worthy. Where their focus shifts to building one's "engine of success" rather than being on chasing the "fruits of success". This is important, because over a lifetime of work, all people go through ups and downs – where the fruits are not in their control. People who are focused on the fruits of success, fall prey to disappointment, loss in motivation, quitting too early, trying to find shortcuts – when fruits don't come. Whereas people focused on building their engine of success continue to contribute steadily, irrespective of whether fruits come or not. This helps them make better choices in life, that leads to steady success & long-term career fulfillment in an uncertain world.*	Same as above
5		**Career Development Pathways for a changing world**	Same as above

		In this topic, students explore a range of diverse "career development models" and the possibilities for contribution each opens up to them. This helps them open up hidden opportunities that such an environment offers. And free themselves from a herd mentality when making career choices.	
6		**Make an impact in every part of one's life** *In this topic, students learn how to expand the contribution possible in any role they have. This helps them take charge of own career growth & discover their power to contribute in any role or job.*	Same as above
7	**Part 3 : Building ability to become solution and value creating individuals in the world**	**Think Solutions** *The market environment in which organizations are operating, is becoming increasingly dynamic and uncertain. So, employers are increasingly seeking out people who can innovate and figure out solutions in the face of any challenge (unlike in the past when it was the people who were most efficient and productive, who were valued by organizations). At the heart of innovation lies this way of thinking of "finding solutions" rather than "seeing problems or roadblocks". Students learn how to build this way of thinking, in this topic.*	Same as above
8		**Value Thinking** *Companies are also looking for employees who do not just work hard, or work efficiently or productively - but those who will make a valuable difference to the fortunes of the company. This difference may come from innovation, but it may also come from focusing on the right things and identifying what really matters – both to the company and to the customers. In this topic, students learn how to build this capability.*	Same as above
9		**Engaging Deeply** *The environment we live in is becoming increasingly complex because more and more things are getting interconnected, new fields are emerging, technologies are rapidly changing, capabilities and knowledge one is trained in will become fast obsolete. In such a scenario, the student's ability to quickly understand and master what is going on, dive deep, get involved in any area, rapidly learn new capabilities that a job demands, is*	Same as above

		important. In this topic, students learn how to engage deeply. Learning how to dive deep, to quickly understand what is going on, get involved in any area, and rapidly learn.	
10	**Part 4 : Building ability to work collaboratively and as good citizens of organizations and the country**	**Enlightened self-interest & collaboration at work** *The changing nature of work in organizations and in the global environment, is increasingly demanding that people work more collaboratively towards shared goals and more sustainable goals. A key to working successfully when multiple stakeholders are involved, is "thinking in enlightened self-interest". In this topic, students learn how to widen their thinking from "narrow self-interest" to "enlightened self-interest" to work more effectively in teams & collaboratives.*	Same as above
11		**Human-centered thinking & Empathy** *In this topic, students learn to recognize & respond to human needs and challenges – the way of thinking at the heart of user-centric designs & customer-centricity.*	Same as above
12		**Trust Conduct** *The biggest currency in a sustainable career is "trust" i.e. being trusted by team members, bosses, customers. When we are trusted, people listen to us, they are willing to give us the chance to grow, give us the space to make mistakes, and work seamlessly with each other without always having to "prove ourselves". In this topic, students learn how to build trust with people they engage with.*	Same as above
Contribution Project Lab Sessions		*3 Contribution projects that help them apply contributor thinking. After students complete their project work (beyond the classroom), each project ends with this 3 hr lab session where they build their project output and present.*	9 hrs (3 hr lab sessions for each of 3 projects)
Project work		*The above Contribution Projects require research, and may need field work beyond the classroom that students are expected to do.*	Beyond classroom

Lab Sessions:

- Students will have to attend twelve discovery-based lab sessions to build new models of thinking & capacities (3 hrs per module)
- They will work closely with their peers to discuss and understand these new models of thinking.
- Their learning will be facilitated by trained college faculty.

Contribution Projects

- Three contribution projects that help them apply contributor thinking
- These will require research and also may need field work
- Each ends with a 3 hr lab session where they build their project output and present

BIJUPATNAIKUNIVERSITY OF TECHNOLOGY, ODISHA

ROURKELA

Curriculum and Syllabus

B. Tech (*CivilEngineering*) from the Admission Batch 2018-19

Semester (7th)

Seventh Semester							
Theory							
Sl No	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Evaluation**
1	HS	RED7E001	Entrepreneurship Development	3-0-0	3	100	50
2	PE	RCI7D001	Prestressed Concrete	3-0-0	3	100	50
		RCI7D002	Design of Concrete Structures-II				
		RCI7D003	Estimating, Costing and Professional Practice				
3	PE	RCI7D004	Integrated Watershed Management	3-0-0	3	100	50
		RCI7D005	Ground Water Hydrology				
		RCI7D006	Water Resource Engineering				
4	OE	RMM7E003	Marketing Management	3-0-0	3	100	50
		RGT6A003	Green Technology				
		RIS7B001	Industrial Safety Engineering				
5	OE	REV5D004	Disaster Management	3-0-0	3	100	50
		RIP7E002	Intellectual Property Right				
		RAE6G001	Finite Element Method				
6	OE	RIT7D001	Internet of Things	3-0-0	3	100	50
		RCS7D007	Soft Computing				
		RIT7D006	E-Commerce & ERP				
7	MC*	RIK7F001	Essence of Indian Knowledge Tradition - II	3-0-0	0		100 (Pass Mark is 37)
Total Credit (Theory)					**18**		
Total Marks						**600**	**300**
Practical							
1	PSI	RMP7H201	Minor Project	0-0-6	3		200
2	PSI	RSM7H202	Seminar - II	0-0-3	1		100
3	PSI	RCV7H203	Comprehensive Viva	0-0-3	1		100
Total Credit (Practical)					**5**		
Total Semester Credit					**23**		
Total Marks							**400**

***Mandatory Non-Credit Courses (MC) result will be reflected with Pass (P) / Fail (F) grade. Thus the grade obtained will not be affecting the grade point average. However it shall appear on the grade sheet as per AICTE rule.**

7^{th} Semester	**RED7E001**	**Entrepreneurship Development**	**L-T-P 3-0-0**	**3 Credits**

Module I: **(10 hours)**

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneurs, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

Module II: **(08 hours)**

Entrepreneurial Environment, Identification of Opportunities, Converting Business Opportunities into reality. Start-ups and business incubation, setting up a Small Enterprise. Issues relating to location, Environmental Problems and Environmental pollution Act, Industrial Policies and Regulations

Module III: **(10 hours)**

Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

Module IV: **(12 hours)**

Sickness of Small-Scale Industries, Causes and symptoms of sickness, cures of sickness, Role of Banks and Governments in reviving industries.

Books:

[1] Entrepreneurship Development and Management, Vasant Desai, HPH
[2] Entrepreneurship Management, Bholanath Dutta, Excel Books
[3] Entrepreneurial Development, Sangeeta Sharma, PHI
[4] Entrepreneurship, Rajeev Roy, Oxford University Press

Digital Learning Resources:

Course Name: Entrepreneurship
Course Link: https://nptel.ac.in/courses/110/106/110106141/
Course Instructor: Prof. C Bhaktavatsala Rao, IIT Roorkee

Course Name: Entrepreneurship Essentials
Course Link: https://nptel.ac.in/courses/127/105/127105007/
Course Instructor: Prof. Manoj Kumar Mondal, IIT Kharagpur

7^{th} Semester	RCI7D001	Prestressed Concrete	L-T-P 3-0-0	3 Credits

Module I: **(10 hours)**

Prestressing system, materials and codes: Basic concept, Losses of prestress, analysis of prestress and bending stresses. Need for high strength steel and concrete. Advantages and applications. Pre-tensioning and post tensioning systems.

Module II: **(08 hours)**

Design of beams : Analysis and design of section for bending and shear, pressure line, concept of load balancing, cracking moment, bending of cables, limit state analysis and design, anchorage zone stresses, design of end block, Application to bridges.

Module III: **(08 hours)**

Selection of prestress concrete members, short term and long term deflections of uncracked members.

Module IV: **(08 hours)**

Flexural strength of prestressed concrete sections,Continuous beams, Design concept concordancy of cables, Secondary design consideration

Module V: **(06 hours)**

Design pre-tensioned and post tensioned beam.

Books:

[1] Prestressed Concrete, N Krishna Raju, Tata McGraw-Hill
[2] Design of Prestressed Concrete Structures, T Y Lin, Ned H Burns, John Wiley & Sons
[3] Prestressed Concrete Structures, P. Dayaratnam, P. Sarah,Medtech Publisher

Digital Learning Resources:

Course Name: Prestressed Concrete Structure
Course Link: https://nptel.ac.in/courses/105/106/105106118/
Course Instructor: Dr.Amlan K. Sengupta,Prof.Devdas Menon, IIT Madras

7th Semester	RCI7D002	Design of Concrete Structures-II	L-T-P 3-0-0	3 Credits

Module I: **(06 Hours)**

Design of Foundations:

Combined Footing: Rectangular,Trapezoidal,raft,strap,pile foundation:single/group pile.

Module II: **(06 Hours)**

Design of Water tanks: Design requirements, Design of elevated and Intze type water tanks. Calculation of dimensions; Design of top dome; Design of top ring beam ; Design of cylindrical wall ; Design of bottom ring beam, Design of portal frames and domes by LSM and using latest IS codes.

Module III: **(10 Hours)**

Earthquake Engineering: Introduction to EQ Engineering: Cyclic behaviour of concrete and reinforcement, significance of ductility, ductility of beam, design and detailing for ductility, simple problems based on above concept, Computation of earthquake forces on building frame using Seismic Coefficient Method as per IS 1893-2016.

Module IV: **(08 Hours)**

Prestressing systems: materials,basic concepts and design of prestressing, losses of prestress, analysis of prestressed beams and slab (pretension and post tension), advantages and application.

Module-V: **(10 Hours)**

Bridge Engineering**:** Introduction: classification and components of a standard bridge, economical span, location of piers and abutments, vertical clearance above HFL, scour depth and choice of bridge type.

Standard Loadings for Road Bridges, Impact effect and impact factor calculation for RCC andsteel bridges,Design of single vent rectangular slab culvert.

Books:

[1] Advanced Concrete Structure Design by P. C. Verghese, Prentice Hall of India
[2] Limit state design- A K Jain, Nem Chand and Brothers
[3] Reinforced Concrete Vol. II [Advanced reinforced concrete] By Dr. H. J. Shah Edition
[4] P. Dayaratham, Design of Reinforced Concrete Structures, New Delhi, Oxford and IBH Publishing Co
[5] Limit state design of reinforced concrete by B.C. Punmia, AK Jain and A.K. Jain, Laxmi Publishers New Delhi 2007
[6] J. Krishna and O. P. Jain, Plain and Reinforced Concrete Vol-I & II, Nem Chand and Bros., Roorkee.

7^{th} Semester	RCI7D003	Estimating, Costing and Professional Practice	L-T-P 3-0-0	3 Credits

Module-I: **(08 hours)**

Quality estimation:

Principles of estimation, methods and units, Estimation of materials in buildings, Culverts and bridges.

Module-II: **(08 hours)**

Specifications-Types, requirements and importance, detailed specifications for buildings, roads, minor bridges and industrial structures.

Rate analysis-Purpose, importance and necessity, factors affecting Analysis of rates, Prime cost, Schedule rates, Analysis of rates for various types of works.

Tender- Types of Tender, Preparation of tender documents, inviting tenders,general and special conditions, contract types. termination of contracts, penalty and liquidated charges, Settlement of disputes, Arbitration, R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, Introduction to e-tendering.

Module-III: **(08 hours)**

Objective and functions of management in construction.

Project Management: Project Planning, Scheduling and Controlling, Bar charts: Development of Bar charts and its shortcomings. Network techniques: Event, activity, Dummy activity. Network rules, Numbering of events, Critical Path Method, Critical activities, Slack, Project Evaluation and Review Techniques (PERT): Time estimates, Different types of Float of activity, Probability of meeting schedule date for the project.

Module-IV: **(08 hours)**

Cost Model: Project cost, indirect and direct cost, slope of direct cost curve, optimum project duration, contracting the network for cost optimization. Introduction to updating, resources smoothing and resources leveling

Module-V: **(08 hours)**

Quality Control: Quality Control by Statistical Methods, Sampling Plan, Control Charts, X Chart, R Chart, C chart and P Chart. Introduction to construction safety.

Books:

[1] Estimating and Costing in Civil Engineering Theory & Practice, B.N. Dutta, UBS Publishers
[2] PERT and CPM, L.S. Sreenath, East West Press
[3] Civil engineering contracts and estimates by B.S. Patil, University Press
[4] Construction Management and Planning, B Sengupta & H Guha, Tata McGraw Hill
[5] PERT & CPM, L. S. Sreenath. East - West Press
[6] Relevant IS Code: National Building Code-2016

Digital Learning Resources:

Course Name:	Construction Economics and Finance
Course Link:	https://nptel.ac.in/courses/105/103/105103023/
Course Instructor:	Dr. Bulu Pradhan, IIT Guwahati.

7th Semester	RCI7D004	Integrated Watershed Management	L-T-P 3-0-0	3 Credits

Module I: **(12 Hours)**

Introduction, watershed behaviour, effects of land use and its change on hydrological cycle components, Land capability and suitability classification.

Measurement of meteorological (temperature, wind speed, sunshine hours, atmospheric pressure, relative humidity) and hydrological (suspended sediment and bed load) parameters Modelling Runoff with SCS methodology, modifications suggested for Indian conditions, case study

Module II: **(14 Hours)**

Erosion process–Factors affecting erosion, Types of erosion Assessment of erosion, Modelling Erosion using USLE, RUSLE, introduction to few other models, Indian studies, case study

Control measures for soil erosion – vegetative and mechanical (including design), for agricultural and non-agricultural lands Wind erosion and its modelling, control measures.

Module III: **(06 Hours)**

Crop water management and crop planning with special reference to different agro-ecological zones in India Water conservation practices for deserts

Module IV: **(04 Hours)**

Watershed development in India, Common Guidelines, Allocation of funds Wetland management- types, hydrologic conditions and water budget, hydrological and ecological functions, the Ramsar convention

Module V: **(04 Hours)**

Drought and its management-causes and impacts, definition, management objectives and strategy-short term and long term measures.

Books:

[1] Sharda V.N., Sikka A.K. and Juyal G.P. (2006) Participatory Integrated Watershed Management: A Field Manual, Central Soil and Water Conservation Research and Training Institute, 218, Kaulagarh Road, Dehradun.

[2] Tideman E.M. (1999) Watershed Management–Guidelines for Indian Conditions, Omega Scientific Publishers, New Delhi.

[3] . Common Guidelines for Watershed Development Projects (2008) Government of India.

[4] Dhruva N.V.V. (2002) Soil and Water Conservation Research in India, Indian Council of Agricultural Research, KrishiAnusandhanBhavan, Pusa, New Delhi- 110012.

[5] Dhruva N.V.V., Sastry G. and Patnaik U.S. (1990) Watershed Management, Indian Council of Agricultural Research, New Delhi.

[6] Frevert R.K., Schwab G.O., Edminster T.W. and Barnes K.K. (2009) Soil and Water Conservation Engineering, 4th Ed, John Wiley and Sons, New York.

[7] Jain S.K. and Singh V.P. (2006) Water Resources Systems Planning and Management, Reed Elsevier India Pvt. Ltd., New Delhi. 6. James L.D. and Lee R.R. (1971) Economics of Water Resources Planning, McGraw Hill Book Company.

Digital Learning Resources:

Course Name:	Watershed Management
Course Link:	https://nptel.ac.in/courses/105/101/105101010/
Course Instructor:	Dr. T.I. Eldho, IIT Bombay.

7th Semester	RCI7D005	Ground Water Hydrology	L-T-P 3-0-0	3 Credits

Module-I: **(12 Hours)**

Hydrologic cycle, Water balance, Occurrence of ground water: Origin, geological formations as aquifers,type of aquifers, groundwater basins, springs. Darcy's Law, validity of Darcy's Law permeability,laboratory and field measurement of permeability, groundwater Flow lines. Steady flow to a well, steady radial flow to a well in confined aquifer and unconfined aquifer, Unsteady radial flow into a confinedaquifer, Non equilibrium Theis equation, Theis method of solution, multiple well system.

Module-II: **(10 Hours)**

Methods of constructions of deep and shallow wells: The percussion (or cable tool) method of drilling,

Direct circulation hydraulic rotary method, Down the hole hammer method, well logs-receptivity logging,testing of wells for yield, Effect of irrigation, stream flow, rainfall on groundwater fluctuations, seasonaland secular variations, fluctuation due to miscellaneous causes.

Surface and Subsurface investigations of groundwater: Geophysical exploration, Electrical resistivitymethod, aerial photo interpretation, remote sensing applications to ground water exploration, test drilling,

Artificial recharge by water spreading, through pits and shaft, recharge through other methods;

Module-III: **(10 Hours)**

Ground water pollution: Municipal sources, liquid wastes from domestic uses, solid wastes, Industrialsources, tank and pipeline leakage, Mining activity, agricultural sources, septic tank and cesspools, salinewater intrusion in coastal aquifers, methods to control saline water intrusion.

Module-IV: **(08 Hours)**

Groundwater management: Concepts of Basin management, Equation of hydrologic equilibrium,groundwater basin investigations, conjunctive use of surface and groundwater.

Books:

[1] Groundwater Hydrology, D. K. Todd, John Wiley and Sons.
[2] Ground Water, H. M. Raghunath, New Age International Publishers.
[3] Groundwater and Tube Wells, S. P. Garg, Oxford and IBH Publishing Co., New Delhi.

Digital Learning Resources:

Course Name:	Ground water hydrology
Course Link:	https://nptel.ac.in/courses/105/103/105103026/
Course Instructor:	Dr.Rajib Kumar Bhattacharya, IIT Guwahati

7th Semester	RCI7D006	Water Resource Engineering	L-T-P 3-0-0	3 Credits

Module-I: **(06 hours)**

Introduction - Hydrologic cycle and significance of its components; Clouds, Precipitation, interception, evaporation, evapo-transpiration, depression storage, infiltration, Interflow and surface runoff.

Precipitation - Measurement of precipitation, rain gauge network, adequacy of Rain gauge station, Test for consistency of record, Estimation of missing data, Mean precipitation over an area, depth-area-duration relationships, maximum intensity/depth-duration-frequency relationship

Module-II: **(08 hours)**

Runoff: Runoff characteristics of streams, Catchment characteristics, Rainfall-Runoff Correlation, runoff volume: empirical equations, SCS-CN method of estimating runoff volume, flow duration curve, flow-mass curve,

Reservoir Planning: capacity of reservoirs, Calculation of storage Volume of reservoir from mass curve, Maintainable demand, Variable demand, Sequent Peak Procedure

Module-III: **(08 hours)**

Hydrograph: factors affecting runoff hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph: derivation, limitations, different duration, Synthetic unit hydrograph, IUH.

Flood:flood estimation, Rational Method, Empirical formula, frequency analysis, Flood Routing, Reservoir routing and Channel routing,

Module-IV: **(08 hours)**

Drought: Definition and Classification, Methods of Water Harvesting, Environmental flow, Environmental flow assessment

Open Channel Flow: Classification of flows, Velocity Distribution, Equation of continuity, energy equation, momentum equation, energy-depth relations, Specific Energy, Critical depth and its computation, critical, subcritical, supercritical flow,

Module- V: **(10 hours)**

Open Channel flow: Uniform flow, Chezy'sKutter's equation, Manning's Formula, Most economical Section, Non-uniform flow, Gradualvaried flow, classifications of flow profiles, Controlled sections; Rapidly Varied flow, Hydraulic jumps

Books:

[1] Engineering Hydrology, K Subramanya, McGraw Hill.
[2] Applied Hydrology, K N Muthreja, Tata McGraw Hill.
[3] Flow in Open Channels, K Subramanya, McGraw Hill
[4] Open Channel Hydraulics, VenTeChowMcGraw Hill Book Company
[5] Water Resources Engineering, L W Mays, Wiley.
[6] Engineering Hydrology, C S P Ojha, R Berndtsson and P Bhunya,, Oxford.
[7] Hydrology and Water Resources Engineering by K. C. Patra, Narosa Publishing House,New Delhi

Digital Learning Resources:

Course Name:	Water Resource Engineering
Course Link:	https://nptel.ac.in/courses/105/104/105104103/
Course Instructor:	Dr.Pranab K Mohapatra, Prof. Rajesh Srivastava, IIT Kanpur.

7th Semester	RMM7E003	Marketing Management	L-T-P 3-0-0	3 Credits

Module I: **(12 Hours)**

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors.

Marketing Planning: Exploring Opportunity, Product -market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behaviour: Factors influencing consumer behavior, consumer decision process. Organizational buying behaviour.

Module II: **(12 Hours)**

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques.

Product Planning: Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module III: **(12 Hours)**

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, E-marketing, Rural Marketing and Service Marketing (concepts only)

Books:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena,"Marketing Management" Tata McGraw Hill, 4/e.
3. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
4. Karunakaran "Marketing Management", Himalaya PublishingHouse, 2010/e.
5. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education

7th Semester	RGT6A003	Green Technology	L-T-P 3-0-0	3 CREDITS

Module I: (12 Hrs)

Global Warming and its effect:- Introduction and physical definition of global warming, the New Carbon Problem: Accumulation, Long Half-Life, Heating Potential, Carbon Emission Factors, Carbon Absorption in Nature, The Global Emission Situation and its effect in India, The Kyoto and Other Protocols and its view in India, Effect of climate change and its impact. Planning for the Future to reduce global warming:- Steps taken to Control Carbon Emissions universally, Use of Promotional and Punitive Mechanisms for Reducing Carbon in Atmosphere, The General Approach in Planning for the Future, Developing Countrywide Adaptive Measures for Safety of Local People, Developing Mitigative Measures for Global Reduction of Carbon, India's National Action Plan on Climate Change (NAPCC) till date, National Mission for a Green India, The MRV Debate.

Module II: (8 Hrs)

Opportunities in Control of Carbon Emissions and Accumulation:- Essential Steps for Control of Carbon Emissions and Accumulation, Procedure to develop own Priorities and Business Opportunities in India for control of carbon emissions and accumulation, Needs a Mix of Green and Traditional Power Sources in India, A Logical Approach for Carbon Reduction, Need in India —More Forests, Less Deforestation and payment rates procedure for controlling carbon emissions and its Promotional Mechanisms at India. Green Technologies for Energy Production: - Various Technologies Available for Energy Production, Cost Comparison of a Few Typical Systems for Power Generation, Sources of Energy Production Already in Use, Alternative Methods Ready for Use, Green Technologies Needing some Prior R&D Work.

Module III: (10 Hrs)

Green Technologies for Personal and Citywide Application: - Measures to be taken for Green city, Carbon Emission Reduction at Personal Level, Carbon Emission Reduction at Local Authority and Citywide Level, Carbon Emissions from Imports. Green Technologies for Specific Applications:- Promotion of 'Green' Buildings, Guidelines, The Energy Conservation Building Code (ECBC), Green Hotels and Hospitals, Green Technologies for Transport, Green Roads, Ports and Harbours, Industries, Carbon, Carbon Emissions from a Few Selected Industries in India, The Changing Scenario in Cities, Need for Wider Application to Town Planning and Area Re-Development Projects, 'Green' Infrastructure for Municipal Services, Bringing up Indian Villages, Green Services for Crematoria, Spreading Message to all Stakeholders.

Module IV: (10 Hrs)

Some High-tech Measures for Reducing Carbon Emissions: - Use of Solar Power with Satellite-Based Systems, Use of Carbon Capture and Storage (Sequestration), Microorganisms, A Quick SWOT Analysis.Recommended Plan of Action: - India's National Action Plan Take Us to a Low-Carbon Path, The Missions Help Develop Awareness, few case studies on Projects undertakenby Various Countries, Adaptive Measures Essential for Indian People to Cope with Climate Change

Books

[1] Green Technologies, Soli J. Arceivala, McGraw Hill Education

[2] Green Technologies and Environmental Sustainability edited by Ritu Singh, Sanjeev Kumar

Digital Learning Resources:

Course Name: Sustainable Materials and Green Buildings

Course Link:https://nptel.ac.in/courses/105/102/105102195/

Course Instructor:Dr. B. Bhattacharjee, IIT Delhi

7^{th} Semester	RIS7B001	Industrial Safety Engineering	L-T-P 3-0-0	3 CREDITS

Module-I: **(7 hours)**

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment
and methods.

Module-II **(7 hours)**

Fundamentals of maintenance engineering: Definition and aim of maintenanceengineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Module-III:(7 hours)

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Module-IV: **(7 hours)**

Fault tracing: Fault tracing-concept and importance, decision treeconcept, need and applications, sequence of faultfinding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic,automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Module-V: **(8 hours)**

Periodic and preventive maintenance: Periodic inspection-concept and need,degreasing, cleaning and repairing schemes, overhauling of mechanical components,overhauling of electrical motor, common troubles and remedies of electric motor, repaircomplexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Books:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, McGraw Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

7th Semester	REV5D004	Disaster Management	L-T-P 3-0-0	3 CREDITS

Module I **(12 hr)**

Understanding Disaster: Concept of Disaster - Different approaches- Concept of Risk - Levels of Disasters - Disaster Phenomena and Events (Global, national and regional) Hazards and Vulnerabilities: Natural and man-made hazards; response time, frequency and forewarning levels of different hazards - Characteristics and damage potential or natural hazards; hazard assessment - Dimensions of vulnerability factors; vulnerability assessment - Vulnerability and disaster risk - Vulnerabilities to flood and earthquake hazards

Module II **(6 hr)**

Disaster Management Mechanism: Concepts of risk management and crisis managements - Disaster Management Cycle - Response and Recovery - Development, Prevention, Mitigation and Preparedness - Planning for Relief

Module III **(6 hr)**

Capacity Building: Capacity Building: Concept - Structural and Nonstructural Measures Capacity Assessment; Strengthening Capacity for Reducing Risk - Counter-Disaster Resources and their utility in Disaster Management - Legislative Support at the state and national levels

Module IV **(12 hr)**

Coping with Disaster: Coping Strategies; alternative adjustment processes - Changing Concepts of disaster management - Industrial Safety Plan; Safety norms and survival kits - Mass media and disaster management

Planning for disaster management: Strategies for disaster management planning - Steps for formulating a disaster risk reduction plan - Disaster management Act and Policy in India - Organizational structure for disaster management in India - Preparation of state and district disaster management plans

Books

1. Manual on Disaster Management, National Disaster Management, Agency Govt of India.
2. Disaster Management by Mrinalini Pandey Wiley 2014.

3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley 2015

1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications 2009.

2. National Disaster Management Plan, Ministry of Home affairs, Government of India

http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf

7^{th} Semester	RIP7E002	Intellectual Property Right	L-T-P 3-0-0	3 Credits

MODULE-I (12Hours)

Introduction: Intellectual property: meaning, nature and significance, need for intellectual property Right (IPR), IPR in India – Genesis and development, IPR in abroad, Examples: - Biotechnology Research and Intellectual Property Rights Management. What is a patent, what can be protected by a patent, why should I apply for a patent? Patent Law, Patentability requirements, non-Patentable subject matters, Layout of the Patents. Procedure for domestic and international filing of applications, Restoration, Surrender and Revocations of Patents, Rights of Patentee and Working of Patent, Licensing and Enforcing Intellectual Property.

MODULE-II (10Hours)

Copyrights: Copyright: meaning, scope; What is covered by copyright? How long does copyright last? Why protects copyright? Related rights, Rights covered by copyright. Ownership: Duration, Division, Transfer and Termination of Transfers.

MODULE-III (10Hours)

Infringement and Remedies: Literal and non-literal infringement, Role of claims, Doctrines on infringement: Equivalent doctrine, Pith and Marrow doctrine, Comparative test. Defences: Gillette Defence, General grounds, Patents granted with conditions, Parallel import. Remedies: Civil, Administrative.

MODULE-IV (08Hours)

State Law: Trade Secret, Contract, Misappropriation, Right of Publicity Trademarks, Trade Secret - Overview, Requirements, Misappropriation of Trade Secret, Departing Employees, Remedies, Criminal Liability, Misappropriation, Clickwrap Agreements, Idea Submissions; Right of Publicity, Federal Pre-emption, Review.

Books:

[1] W. R. Cornish and D. Llewellyn, Intellectual Property: Patents, Copyrights, Trade Marks and Allied Rights, Sweet & Maxwell.
[2] Lionel Bently and Brad Sherman, Intellectual Property Law, Oxford University Press.
[3] P. Narayanan, Intellectual Property Law, Eastern Law House
[4] B. L. Wadehra, Law Relating to Intellectual Property, Universal Law Publishing Co.
[5] V. K. Ahuja, Law Relating to Intellectual Property Rights, LexisNexis
[6] AjitParulekar and Sarita D'Souza, Indian Patents Law – Legal & Business Implications;Macmillan India ltd, 2006
[7] P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi, 2010.

7th Semester	RAE6G001	Finite Element Method	L-T-P 3-0-0	3 Credits

Module – I INTRODUCTION

Review of basic approximate methods of analyses – Stiffness and Flexibility matrix for simple cases – Governing equation and convergence criteria of finite element method.

Module – II DISCRETE ELEMENTS

Bar, Frame, beam elements – Application to static, dynamic analysis.

Module – III CONTINUUM ELEMENTS

Various types of 2-D-elements Application to plane stress, plane strain and axisymmetric problems.

Module – IV ISOPARAMETRIC ELEMENTS

Applications to two and three-dimensional problems(four, eight and nine nodded element), Numerical Integration

Module – V FIELD PROBLEM

Applications to other field problems like heat transfer and fluid flow.

Books

1. Tirupathi.R.C and Ashok D.B, “Introduction to Finite Elements in Engineering”, Prentice Hall India, Third Edition, 2003.

2. Reddy J.N. “An Introduction to Finite Element Method”, McGraw-Hill, 2000.

3. Krishnamurthy, C.S., “Finite Element Analysis”, Tata McGraw-Hill, 2000.

4. Bathe, K.J. and Wilson, E.L., “Numerical Methods in Finite Elements Analysis”, Prentice Hall of India, 1985.

7^{th} Semester	RCS7D007	Soft Computing	L-T-P 3-0-0	3 Credits

Module I: **(14 Hrs)**

Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non - linear Error surface and optimization

Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzification; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

Module II: **(14 Hrs)**

Neural networks: Single layer networks, Perceptron; Activation functions; Adaline- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self - organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS).

Module III: **(8 Hrs)**

Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Books:

1. F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design - Theory, Tools and Applications". Pearson Education. (Printed in India).
2. J. S. R. Jang. C. T. Sun and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
3. Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
4. S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India. 4) V. Keeman,"Learning and Soft computing", Pearson Education, India.
5. R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

7^{th} Semester	RIT7D006	E-Commerce and ERP	L-T-P 3-0-0	3 Credits

Module I

Overview of Electronic Commerce, Driving the Electronic Commerce Revolution, The Internet, Portals. Open Systems Inter Connection (OSI) Model, XML, Data Warehousing, BuildingOwnWebSite,InternetSecurity

Module II

E-Commerce and Internet, Electronic Market, Business to Business E-Commerce, Four C`s (Convergence, Collaborative Computing, Content Management and Call Center), Wireless Application Protocol (WAP), Intranet and Extranets. Data Interchange (EDI), Electronic PaymentSystems,E-Security

Module-III

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to consider in planning designing and implementation of cross functional integrated ERP systems. Small, medium and large enterprise vendor solutions, BPR, and best business practices - Business process Management, Functional modules.

Module IV

ERP IMPLEMENTATION: Planning Evaluation and selection of ERP systems, Implementation life cycle - ERP implementation, Methodology, Data Migration, Success and Failure factors of ERP Implementation. Extended ERP systems and ERP add-ons - CRM, SCM, Manufacturing prospective, Business analytics .

Book:

1. E- Commerce and Enterprise Resource Planning; CSV Murthy, HPH
2. Enterprise Resource Planning- Concepts and Practices ; V K Garg and N K Venkatkrishna, PHI
3. Enterprise Resource Planning; AlexixLeon ; TMH

7th Semester	RIK7F001	Essence of Indian Knowledge Tradition - II	L-T-P 3-0-0	0 CREDITS

Course Objectives:

1. To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.
2. To make the students understand the traditional knowledge and analyse it and apply it to their day to day life

Course Outcomes :

At the end of the Course, Student will be able to:

1. Identify the concept of Traditional knowledge and its importance.
2. Explain the need and importance of protecting traditional knowledge.
3. IIllustrate the various enactments related to the protection of traditional knowledge.
4. Interpret the concepts of Intellectual property to protect the traditional knowledge.
5. Explain the importance of Traditional knowledge in Agriculture and Medicine.

Module-1:

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, Indigenous Knowledge (IK), characteristics, traditional knowledge vis-a-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge

Module-2:

Protection of traditional knowledge:The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

Module-3:

Legal framework and TK: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016.

Module-4:

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge

Module-5:

Traditional Knowledge in Different Sectors: Traditional knowledge and engineering, Traditional medicine system, TK in agriculture, Traditional societies depend on it for their

food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK

Books:

1. Traditional Knowledge System in India, by Amit Jha, 2009.

2. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.

3. "Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino.

Digital Learning Resources:

Course Name:	Ayurvedic Inheritance of India
Course Link:	https://nptel.ac.in/courses/121/106/121106003/
Course Instructor:	Dr M. S. Valiathan, IIT, Madras

https://www.youtube.com/watch?v=LZP1StpYEPM

EIGHTH SEMESTER(COMMON TO ALL BRANCHES OF B.Tech)							
Theory							
Sl No	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Evaluation**
-	-	-	-		0		
				Total Credit (Theory)	**0**		
				Total Marks			
				Practical			
1	PSI	RMP8H201	Major Project / Internship	0-0-12	6		400
				Total Credit (Practical)	**6**		
				Total Semester Credit	**6**		
				Total Marks			**400**