M.Tech. Program in Construction Management (with revised Course-codes)

COURSE STRUCTURE

SEMESTER-I

Course Code	Title	Credits	Contact Hours
10M11CE111	Construction Techniques	3	3
10M11CE112	Estimating & Costing	3	3
10M11CE113	Construction Planning & Control	3	3
10M11CE114	Construction Safety and Health	3	3
10M11CE115	Mechanical and Electrical Systems in Buildings	3	3
10M19CE191	Construction Capstone Project	2	4
	Total	**17**	**19**

SEMESTER-II

Course Code	Title	Credits	Contact Hours
10M11CE211	Construction Contracts and Laws	3	3
10M11CE212	Heavy/Civil Construction Equipment, Methods, and Management	3	3
10M11CE213	Construction Cost Analysis	3	3
10M11CE214	Construction Financial Management	3	3
10M11CE215	Sustainable Design and Construction	3	3
10M19CE291	Construction Capstone Project	2	4
	Total	**17**	**19**

Industrial Training*	8 weeks

*** For fresh B. Tech graduates only, at the end of second semester.**

SEMESTER-III

Course Code	Title	Credits	Contact Hours
10M13CE331-332	Elective-1	3	3
10M13CE333-334	Elective-2	3	3
10M19CE391	Seminar	2	-
10M19CE392	Project, Part- I	12	24
	Total	**20**	**30**

SEMESTER-IV

Course Code	Title	Credits	Contact Hours
10M14CE431-432	Elective-3	3	3
10M14CE433-434	Elective-4	3	3
10M19CE491	Project seminar	2	-
10M19CE492	Project, Part-II	14	28
	Total	**22**	**34**

 # Project evaluation shall be done out of 26 credits at the end of IV semester.

List of Electives

10M13CE331	Leadership and Human Resource Management
10M13CE332	International Construction Business Management
10M13CE333	Advances in Construction Materials
10M13CE334	Principles of Affordable Housing
10M13CE431	Construction Information Systems
10M13CE432	Construction Methods Improvement
10M13CE433	Facilities Management
10M13CE434	Value Engineering

COURSE CONTENTS

M.Tech. in Construction Management

SEMESTER -I

1. Construction Techniques: Construction techniques associated with steel and reinforced concrete framing; floor systems; roof systems; masonry construction; curtain walls; building insulation; and interior and exterior finishes . C oncrete formwork design, construction techniques for high rise buildings, fire resistant construction techniques, Cost Effective Construction Technique (CECT), repair techniques, innovative construction techniques, prefabrication and pre-casting, modular construction, in-situ pre-fabrication, lift slab and tilt up construction

2. Estimation & Costing : Different types of estimates and their uses; quantity takeoffs - providing lists of quantities of all the items of materials and equipment necessary to complete a project - based on the drawings and specifications; estimate the probable cost of construction projects including direct and indirect costs; use of computer to assist in the preparation of the estimate; Parametric Cost Estimating techniques; and labor and equipment costs considering productivity factors

3. Construction Planning & Control Conversion of a Scope of Work into scheduling activities; developing a building plan including preconstruction, construction, and procurement activities; preparing, analyzing, and updating Bar Charts and Critical Path Method Networks; prepare and presenting schedule information; assigning and analyzing resource requirements of a project; performing time/cost trade-off analyses; justifying claims for additional time; processing schedule information in a computerized scheduling package; controlling cost by applying the Earned Value Analysis and other progress metrics

4.Construction Safety and Health: Concept of safety, factors affecting safety: psychological and technological, planning for safety provisions, techniques for construction safety management, safety considerations during construction, demolition and use of equipment; management of accidents/injuries, site management with regard to safety recommendations, training for safety awareness, implementation of health & safety plans, construction hazards & solutions, formulation of safety manuals, safety legislation, standards/codes with regard to construction safety, case studies, construction safety management – fundamentals, measuring performance & recording information, health hazard in construction, personal protective and lifesaving equipment, the safety policy; assessing the risks, control strategies for construction work; fire safety, the health and safety plan, training; meetings, understanding people, access to information, environment, health and safety issues - construction and the environment, construction health and safety law

5.Mechanical & Electrical Systems in Buildings- Site utilities (water, sewer, gas, and storm); residential and commercial plumbing systems; and specialty topics of fire protection, storm water, and natural gas; HVAC fundamentals, pumps, ventilation & cooling, air conditioners, and heating systems; introduction to electricity, power systems and equipments, general requirements & planning of electrical and communication installations, inspection and testing of installations, lightning protection of buildings, boxes and conduit, service and distribution, transformers, grounding, branch circuits and feeders, motors and motor controls, lighting, fire alarm system, and low voltage systems

6.**Construction Capstone Project:** Student will be required to design a construction project, such as, commercial, educational, high rise residential, highway, bridges or industrial nature based on the undergraduate knowledge. They will develop a conceptual design and complete cost estimate and construction schedule. There will be one mid term evaluation, a presentation at the end followed by a viva-voce examination

SEMESTER -II

1.Construction Contracts and Laws: Basics of the legal system including contracts, torts, land zoning and property ownership, bonds and insurance, bidding, subcontracting, contractor liability, mechanics liens, litigation and arbitration, Indian and international construction law, hazardous waste issues and labor laws, disputes and disputes resolutions, case studies, Indian contract act, elements, types, features-suitability-design of contract documents, international contract document, law of torts; tenders: prequalification-bidding-accepting-evaluation of tender, formation and interpretation, potential contractual problems, world bank procedures and guidelines; BOT projects, arbitration, comparison of actions and laws, agreements, conditions of arbitrations, powers and duties of arbitrator, rules of evidence, Dispute Redressal Boards(DRB), Laws: legal requirements, insurance and bonding, laws governing sale, purchase and use of urban and rural land, land revenue codes, tax laws, income tax, sales tax, excise and customs duties, legal requirements for planning, property law, agency law, local government laws for approval, statutory regulations

2.Heavy/Civil Construction Equipment, Methods, and Management: Planning and executing heavy/civil construction projects, earthwork quantities ; fundamental concepts of equipment economics; earthmoving equipment, operations, productivity, and capabilities; compaction and stabilization equipment; rock blasting and drilling equipment; asphalt mix production and placement; hoisting equipment; piles and pile driving equipment; equipment safety; optimizing crew and equipment; heavy equipment costs

3.Construction Cost Analysis: Cost-Benefit analysis, economic performance analysis- incremental analysis, economic feasibility analysis; advanced conceptual estimating techniques, quick methods of determining approximate costs of a project, life cycle cost analysis- technique of economic evaluation that sums the costs of initial investments, replacements, operations, maintenance and repair investments, case studies

4.Construction Financial Management: Introduction, modern financing theory, real estate development & finance, construction accounting systems, analysis of financial statements, managing costs, determining labor burden, managing general overhead costs, setting profit margins for bidding, profit center analysis, cash flows for construction projects & construction companies, time value of money, risks & uncertainties and management decision in capital budgeting, taxation and inflation, financing a company's financial needs, tools for making financial decisions, interest factors, amortization schedule, computerized accounting systems, international financial management, practical problems & case studies

5. Sustainable Design and Construction: Sustainability, challenges in sustainable construction, design construction and equipment, materials and systems, maintenance and conservation, waste materials, site waste management, re-use and recycling of materials, Energy efficient buildings, concepts of green and

sustainable buildings, natural lighting, rainwater harvesting, solar panels and solar HVAC systems, sustainable building design, rating system, delivery of green buildings

6. **Construction Capstone Project:** Student will be assigned a proposed construction project, such as, commercial, educational, high rise residential, highway, bridges or industrial nature. Student will be required to complete site, geological and economic feasibility studies including city building bye laws and rules. They will develop a conceptual design and complete cost estimate and construction schedule. There will be one mid term evaluation, a presentation at the end followed by a viva-voce examination

SEMESTER -III & IV

Elective 1-4 Every student will select any four courses from the given list of electives.

Seminar/Project Seminar: **Student willreview literature, perform calculations & small experiments,wherever required& possible related to his seminar topic. There will be one mid term and one final evaluation. Evaluation will be done on the basis of presentation followed by questionnaire/viva voce examination. In final evaluation student will also submit a report.**

Project: **Student will complete project work in the area of construction management under the supervision of guide. The students will do project based on literature review; experiments if possible and write a thesis report. Total credits assigned for project work are 26. Twelve credits will be evaluated in the third semester and will be carried over to fourth semester for final evaluation of project work.**

List of Electives

10M13CE331	Leadership and Human Resource Management
10M13CE332	International Construction Business Management
10M13CE333	Advances in Construction Materials
10M13CE334	Principles of Affordable Housing
10M13CE431	Construction Information Systems
10M13CE432	Construction Methods Improvement
10M13CE433	Facilities Management
10M13CE434	Value Engineering

COURSE CONTENTS

1. Leadership and Human Resource Management: Overview of project management, TEAM, essential concepts of leadership and management, building leadership skills, leadership characteristics, leadership theories, leaders & managers, winning strategies for the construction industry, constructive communication, human motivation, integrating motives and emotions into a holistic pattern of leadership, personal orientation motive in leadership, place orientation and leadership, time orientation and leadership, organization strategy, crisis management, case studies

2.International Construction Business Management: Introduction, preparation for entry into international construction, international trade and the nature of international construction, international construction finance; key factors in operating and sustaining a business, business development and project management in international markets, impact of social, cultural, legal and financial aspects of international

contracting, logistics of labor, materials, and equipment in a foreign environment, models of human resource management applied to international construction, the global market and competitive advantage, case studies- international consultant & contract, special problems

3.Value Engineering: Introduction, concept of cost & value, objectives, fundamentals and principles, methodology, techniques and applications of value engineering, project scope and budget, cost control, cost models, function analysis, life cycle costing, integrating value engineering in planning, design and construction, case studies

4.Construction Methods Improvement: Methods analysis, work analysis, work methods improvement, productivity analysis, measuring productivity, time study, standard data systems, predetermined time systems, work sampling, physiological work measurement, labor reporting, improving productivity, introduction to ergonomics, incentives to increase productivity, alternative methods for increasing productivity, case studies

5. Construction Information Systems: Management information systems in construction industry,current integration of computer aided design (CAD), computerized project management systems, use of automated programs for planning, scheduling, estimating and controlling construction projects, data processing and applications in pricing, tendering, scheduling and cost control system, simulation of construction operations,internet technology, web applications in construction, use of project planner software

6. Advances in Construction Materials: Newer and improved materials of construction, steel having greater ductility, tensile strength and corrosion resistance, high performance concrete, self compacting concrete, chemicals, epoxies, latexes and bonding agents for repairs, geotextiles and geomembranes

7. Facilities Management : Introduction and overview of facility management, long range and annual facility planning, financial forecasting budgeting and appropriations; real estate considerations, analysis and planning; interiors and space planning; construction and renovation; types of maintenance programs, maintenance technologies, commissioning existing buildings, metering for operations and maintenance, O&M for major equipment types, operational efficiency, computerized maintenance management system, administrative services and technology

8. Principles of Affordable Housing: Introduction and overview, current trends in affordable housing, project feasibility, affordable housing policy, practice and issues, affordable housing development process, financing affordable housing, site planning, architecture and cost of new and rehabilitated affordable housing, nonprofit housing development, future of affordable housing production

PRESENTATION AND COMMUNICATION SKILLS

Course Code: 07B11PD301
Credits: 03

Learning Objectives:
To develop effective **presentation and communication skills** that enable the students to speak, write and present in clear, correct, concise, and audience-centered manner, which has grammatical correctness, and a graceful, uncluttered style. It aims to:

- inculcate effective **listening skills** that enable them to comprehend instructions and become a critical listener
- augment effective **oral skills** that enable them to speak interpersonally
- develop active **reading skills** that is reading with an awareness of a purpose, and
- Instill the **writing skills** in a lucid style which ensures careful and nuanced textual analysis, command of primary and secondary materials, and interpretive judgment.

Course Content:

Introduction to Communication

Oral Communication skills:

Stress, Rhythm, Intonation, Coherence, Phonetics etc.

Listening Skills

Reading Skills:

Intensive and Extensive Reading

SQ3R

Vocabulary and morphology

Writing Skills:

Letter Writing

Circulars, Notices, Agenda, Minutes

Report Writing

Power point presentation

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Recommended Books : 1. Business Communication by KK Sinha (Text)
2. Basic Business Communication by Lesikar Flatley

MATHEMATICS-I

Course code: 07B11MA101

Credits: 04

Prerequisite(s): None

Learning outcome: After studying this course the students would gain enough knowledge to solve mathematical and physical problems.

Course Outline:

Calculus and Analytical Geometry:Partial differentiation, chain rules, change of variables, Taylor's series for function of two or more variables, maxima and minima, Jacobeans, Double integrals, change of order and change of variables. Applications to areas and volumes.

Equations to a line and a plane (preferably using vectors).Equations to curves and surfaces, Line and surface integrals, Gradient, divergence and curl, Normal and tangent to a surface, Gauss and Stoke's Theorems.

Differential Equations I: Differential Equations (Linear 2^{nd} order) with constant co-efficient, Equations of the form y''=f(y). Laplace Transform, Inverse Laplace Transform, Dirac delta and unit step function, solution of initial value problems.

Matrices: Algebra of Matrices, Elementary row transformations and row echelon form, Determinant of a matrix, Solution of a system of equations by Gauss elimination, Rank and linear dependence. Eigenvalues and vectors of a square matrix, symmetric matrices, Reduction to diagonal form, Quadratic forms.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

BOOKS & REFERENCES

1. Thomas, G.B., Finney, R.L., *Calculus and Analytic Geometry*, 9^{th} Ed. Addison Wesley,1996

2. Kreyszig, Erwin., Advanced Engineering Mathematics, 8^{th} Edition, A Wiley Publication

3. Lipshuts, S., Lipsom, M., *Linear Algebra*, 3^{rd} Edition, Schaum Series 2001.

4. Simmons, G.F., *Differential Equations with Applications*, 2^{nd} Edition .McGraw-Hill 1991.

5. Grewal, B. S. Higher Engineering Mathematics, Khanna Publishers.

PHYSICS-I

Course Code: 07B11PM101
Course Credits: 4

Objective

Broadly, the study of Physics improves one's ability to think logically about the problems of science and technology and obtain their solutions. The present course is aimed to offer a broad aspect of those areas of Physics which are specifically required as an essential background to all engineering students for their studies in higher semesters.

Learning outcomes

At the end of the course, the students will have sufficient scientific understanding of different phenomena associated with light, relativity, statistical physics, atomic physics, lasers.

Course Outline

Physical Optics: Analytical treatment of interference, Intensity distribution of fringe system, Fresnel's biprism, Newton's rings, Diffraction (limited to Fraunhofer class) from Single slit, double slit and Diffraction grating, Polarization, Phenomenological understanding of Birefringence, Principles of use of uniaxial crystals in practical polarizers, compensators and wave plates, Production and analysis of completely polarized light. Optical activity.

(15 Lectures)

Relativity: Michelson-Morley experiment, Lorentz transformations, Addition of velocities, Mass variation with velocity, Mass-energy relation. **(5 Lectures)**

Radiation: Black body radiation, Wein,s law, Rayleigh Jeans law, Planck's law of radiation, Compton scattering.

(4 Lectures)

Atomic Structure: Origin of spectral lines, spin and orbital angular momentum, Quantum numbers, Atoms in magnetic field, Zeeman effect. **(5 Lectures)**

Statistical Distributions: Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac distributions and their applications.

(4 Lectures)

Lasers: Principle and working of laser, Different types of lasers (He-Ne Laser, Ruby Laser, Semiconductor Laser), Holography. **(7 Lectures)**

Methodology

The course will be covered through lectures supported by tutorials. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given. Students will be required to be regular in the course and complete the assignment by their own but if needed difficulties will be discussed in the tutorials. There will be at least two class tests/ surprise tests conducted during the tutorial classes in the whole semester.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Text Books

1. Subrahmanayam and Brij Lal, *A Text Book of Optics*, S. Chand and Co.
2. Ghatak, *Optics*, Tata McGraw Hil.
3. B. B. Laud, *Laser and Non-Linear Optics*, New Age International (P) Ltd.
4. R. S. Sirohi, *Wave Optics, Orient and Longman.*
5. Reshnick, *Relativity, New Age.*
6. A. Beiser, *Perspectives of Modern Physics*, Mc Graw Hill International.

Reference Books

1. F. A. Jenkins and H. E. White, *Fundamentals of optics*, Tata McGraw Hill.
2. B. K. Mathur, *Physical Optics*.

PHYSICS LAB-I

Course Code: 07B11PM701
Credits: 01
Objective: Broadly, the study of Physics improves one's ability to think logically about the problems of science and technology and obtain their solutions. The present course is aimed to offer a broad aspect of those areas of Physics which are specifically required as an essential background to all engineering students for their studies in higher semesters.
Learning outcomes
At the end of the course, the students will have sufficient scientific understanding of different phenomena associated with light, relativity, statistical physics, atomic physics, lasers.

THEORY PART & LABORATORY EXPERIMENTS:

1. To study the variation of magnetic field along the axis of Helmholtz Galvanometer and to determine its reduction factor.[set-up no. 1 & 11]

2. To determine the specific rotation of cane sugar solution using Biquartz polarimeter. [set-up no. 2 & 12]

3. To observe Newton's rings and to determine the wavelength of sodium light.[set-up no. 3 & 13]

4. To determine the wavelengths of spectral lines Red, Green and Violet of mercury using plane transmission grating. [set-up no. 4 & 14]

5. To study the presence of energy levels in an atom by Franck-Hertz Experiment. [set-up no. 5 & 15]

6. To determine the resistance per unit length of a Carey Foster's bridge and to obtain the specific resistance of a given wire. [set-up no. 6 & 16]

7. To determine the Planck's constant using solar cell. [set-up no. 7 & 17]

8. To determine the wavelength of sodium light with the help of Fresnel's biprism.[set-up no. 8 & 18]

9. To draw hysteresis loop of a ferromagnetic material and to calculate its retentivity and coercivity. [set-up no. 9 & 19]

10. To study ultrasonic waves in aluminium and to obtain Young's modulus for it. [set-up no. 10& 20]

Text Books

1. Subrahmanayam and Brij Lal, *A Text Book of Optics*, S. Chand and Co.
7. Ghatak, *Optics*, Tata McGraw Hil.
8. B. B. Laud, *Laser and Non-Linear Optics*, New Age International (P) Ltd.
9. R. S. Sirohi, *Wave Optics, Orient and Longman.*
10. Reshnick, *Relativity, New Age*.
11. A. Beiser, *Perspectives of Modern Physics*, Mc Graw Hill International.

Reference Books

3. F. A. Jenkins and H. E. White, *Fundamentals of optics*, Tata McGraw Hill.

INTRODUCTION TO COMPUTER PROGRAMMING

CODE: 07B11CI101

CREDITS: 4

PREREQUISITE(S): None

OBJECTIVE: This class is designed to explore computing and to introduce the art of computer programming. Students will develop a sense of style and aesthetics for programs that will help their programming.This course teaches not only the mechanics of programming, but also how to create programs that are easy to read, maintain, and debug.

LEARNING OUTCOMES:

1 Knowledge of structured programming in program design
2 Writing programs in C, Pascal
3 Program documentation skills
4 Program testing skills

COURSE CONTENT:

Introduction to Programs
Processing programs
Types of Programming Languages
Programming Design tools (Pseudo code and Flowcharts)
Program Design
Structured Programming
Problem solving and programming
Quality aspects of structured programs
Testing and Debugging Techniques
Self Learning of Pascal

TEACHING METHODOLOGY

The course will cover the use of C language. Students will learn Pascal programming on their own. The expectation is that students will become self-sufficient in learning any programming language on their own thereafter. Students will write the same programs in Pascal as given in the C laboratory

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

BOOKS & REFERENCES

Text Book: "The Complete Reference C", Herbert Schildt.

Reference Books:

1. "Understanding Pointers in C", Yashwant Kanetkar
2. "The Practice of Programming", Brian W. Kernighan and Rob pike.
3. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie. Prentice Hall, Inc.
4. "Program Design and Development", Charles Dickson.
5. "Programming in PASCAL", Schuam's Series.

COMPUTER PROGRAMMING LAB

CODE: 07B11CI701

CREDITS: 02

OBJECTIVE:

This course is designed to familiarize students with the basic components of a computer, so as to be able to operate it and be able to interact with it, and carry out simple tasks.Also, it will initiate the students into the discipline of Programming. It aims to start off the development of problem solving ability using computer programming. This course teaches not only the mechanics of programming, but also how to create programs that are easy to read, maintain, and debug. Students are introduced to the design principles for writing good programs.

LEARNING OUTCOME:

Students will develop their ability to design, develop, test and document structured programs in C language.

THEORY PART & LABORATORY EXPERIMENTS :

Initial exercises on MS office.
Familiarity with Microsoft word.
Familiarity with Microsoft power point.
Familiarity with Microsoft excels.
Pattern generating problems.
Loop Control and Case Control Structures.
Arrays and Strings.
Functions and Pointers.
Structures and Union.
Recursion, Dynamic Memory Allocation, linked-lists.
File I/O, the C Library

Text Book:

T1. It will be diversified from various sources

Evaluation Scheme:

P -1	15 marks
P -2	15 marks
Continuous Evaluatoion	70 marks
Total	**100 marks**

ELECTRICAL CIRCUIT ANALYSIS

Course Code: 07B11EC101
Credits: 04

Course Contents

Introduction to circuit elements R, L, C and their characteristics in terms of Linearity and time dependant nature, DC and AC sources, Current and Voltage sources, Dependent and Independent sources, Source transformation, Ohm's law, KCL and KVL, Node and Loop analysis, Star and Delta conversion. **Network Theorems** – Thevenin's and Norton's theorem, Superposition, Reciprocity, Maximum Power Transfer and Millman's theorem.**Graph of a network, Tree and links, planar networks, Number of independent network equilibrium equations. Ideal opamp as a circuit element, Networks containing dependent sources and the ideal opamp**.

AC waveform analysis, frequency, phase, amplitude, peak, rms and average value of ac waveform, single phase ac circuit analysis containing *R*, *L* and *C*, and their combinations. concepts of impedance, power, active, reactive and apparent power and power factor, sinusoidal and phasor representation of voltage and current. Series and parallel resonance, bandwidth and quality factor, concept of 3-phase ac circuits, star and delta connections.

Frequency domain analysis – Laplace transform solution of Integral differential equations. Transform of Waveform – synthesized with step, ramp, and sinusoideal functions. Initial & final value theorem. **Forced and natural responses**

Transient analysis, Transients in RL, RC and RLC circuits, initial conditions, time constants.

Concept of two-port Network, Relationship of two – port variables, Types of two-port network parameters- Z, Y, transmission (ABCD), Hybrid. Conversion from one parameters to another. Introduction to electrical filters and transmission line.

TEACHING METHODOLOGY

The course will cover the use of C language. Students will learn Pascal programming on their own. The expectation is that students will become self-sufficient in learning any programming language on their own thereafter. Students will write the same programs in Pascal as given in the C laboratory

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Text book

- B.L Theraja, Basic Electrical Engineering , Vol. 1 (For unit 1 and 2)
- K.M. Soni " circuits and System" S.K.Kataria & sons (for unit 3,4 ,5, and 6)
- Dr.Abhijit Chakrabarti " Circuit Theory
- W.H.HAYT ETAL :Engineering Circuit Analysis(6^{th} Edition), Tata McGraw-Hill, 2006

References:

- M.E. Van Valkenburg, Network Analysis, (PHI)

ELECTRICAL CIRCUIT ANALYSIS LAB

Code: 07B11EC701
Credits: 01
Prerequisite:
Student must have already registered for the course, “Electrical Circuit Analysis” (07B11EC101).

Objectives & Learning Outcomes:

Students will be able to do the analysis of electrical circuits. They will also be able to measure the voltage, current, power and impedance of any circuit. After completing this lab, they will also be able to measure the frequency, and amplitude of any signal using CRO.

Course content:

1. Familiarization With Various Electrical and Electronics components
2. Network Theorems
3. Two-port Parameters
4. Active filters

Evaluation Plan

Total Marks	**100**
Marks Distribution	
1. Continuous evaluation	70
a) Attendance	15
b) Record submission	15
c) Regularity, sincerity and viva	40
2. Mid- Sem Lab. Exam	15
3. End –Sem Lab. Exam	15

Text book

1. B.L Theraja, Basic Electrical Engineering , Vol. 1
2. K.M. Soni " circuits and System" S.K.Kataria & sons
3. Dr.Abhijit Chakrabarti “ Circuit Theory

References:

- M.E. Van Valkenburg, Network Analysis, (PHI)

GROUP AND CO-OPERATIVE PROCESS

Course Code : 07B21PD303
Credits : 03 (3-0-0)

Objectives: To make the students understanding how to work with and through others to accomplish individual and group goals. Methods of instruction will include cases, simulations, lectures and group activities.

Learning Outcomes: After completing this course the students will have an understanding of individual, interpersonal and group processes that influence behavior within teams and organizations. They will also be able to effectively use the various tools in their daily activities.

Course Content:
Group-- Behavior, Development, Structure and Process;
Team-- Types and Contemporary issues;
Individual-- Personality, Learning, Perception, Values, Attitudes and Job satisfaction
Assertiveness-- Communication Styles, self expression, Social Boldness;
Emotional intelligence;
Transactional Analysis-- Ego states, Life position, Transaction, Stroking;
Motivation;
Leadership;
Conflict and Negotiation;

Recommended Books:
Stephen P. Robbins, *Organizational Behaviour*, 9th Edition, Prentice-Hall India. (Text)

Reference:
- Daniel Goleman, Emotional Intelligence;
- Randy J. Paterson, The Assertiveness Workbook
- Daniel Goleman, Working With Emotional Intelligence, Bantom Books

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

MATHEMATICS – II

Course Code: 07B21MA102

Credits: 04 (4-0-0)

PREREQUISITE(S): None

Learning outcome: After studying this course the students would gain enough knowledge to solve mathematical and physical problems.

Course Outline:

Differential Equations **23 Lectures**

Second order linear differential equations with variable coefficients. Convergence of series, convergence tests. Solution in series. Bessel and Legendre functions. Chebyshev polynomials. Orthogonality, Second order partial differential equations and their classification. One dimensional wave and diffusion equations and their applications. Laplace and Poisson equations. Use of Green's function.

Complex Variables **22 Lectures**

Functions of a complex variable. Analytic functions and Cauchy-Riemann equations. Conformal mapping. Poles and singularities. Complex Integration. Taylor's and Laurent's series. Cauchy residue theorem, contour integration and their applications.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Text Books:

1. Kreyszig, Erwin : Advanced Engineering Mathematics, John Wiley & Sons, Inc.
2. Simmons, G.F. : Differential Equations with Applications, 2nd Ed., McGrawHill, 1991.
3. Brown, J.W., Churchill, R.V. : Complex Variables and Applications, 6th Ed., McGrawHill, 1996.

Reference books:

1. Spiegel, Murray R. : Theory and Problems of Complex variables Schaum's series
2. Sneddon I. N. : Introduction to Partial Differential Equations
3. Grewal, B. S. : Higher Engineering Mathematics

DATA STRUCTURES

Course Code: 07B21CI102
Credits: 04 (4-0-0)
Prerequisite
Students must have already registered for the course, "Introduction to Computers and Programming"

Objectives
Develop problem solving ability using Programming, develop ability to express solutions to problems clearly and precisely, develop ability to design and analyze algorithms, introduce with fundamental data structures, develop ability to design and evaluate Abstract Data Types and data structures.

Learning Outcomes
The students shall acquire the generic skills to design and implement data structures and related algorithms for a broad-based set of computing problems.
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Course Content
Data centric approach to software development. Problem analysis and Data design. Time and space complexity, Searching. Sorting, Algorithm visualization, Data types and representation. Abstract Data Types, Tagged, Array based, Linked, Indexed, and simulated pointer based storage. Lists, Electronic text, Hypertext, Orthogonal Lists, Sparse matrices List of list. Doubly linked lists. Stack. Recursion removal. Queue. Dequeue. Buffer. Discrete event simulation. Tree, Binary Tree, K-ary Tree, Binary Search Tree. Tree traversal. Graphs and graph traversal. Simple graphics and multimedia data structures. Kd Tree. Quad Tree, Octree.

Teaching Methodology
Lectures would be interactive and it would cover the core concepts that are explained in the text and reference materials with adequate examples. Tutorials will have conceptual and numerical questions that would aid in strengthening the data structures principles.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Text Books
1. Sartaj Sahni, "Data Structures, Algorithms", Tata Mc Graw Hill, New York
2. Preiss, Bruno R., "Data Structures and Algorithms: With Object-Oriented Design Patterns in C++ ", John Wiley & Sons, New York, 2003.

Reference Books
1. Kruse, Tonso, Leung: Data Structures and Program Design in C
2. Langsam, Augestein, Tenenbaum : Data Structures using C and C++
3. Weiss: Data Structures and Algorithm Analysis in C/C++
4. Carrano and Prichard: Data Abstraction and Problem solving with C++
5. Horowitz and Sahani: Fundamental Data Structures
6. Sahani : Data Structures, Algorithms and applications in C++
7. Standish: Data Structures in Java
8. Corman et al: Introduction to Computer Algorithms

DATA STRUCTURES AND COMPUTER PROGRAMMING LAB

Course Code: 07B21CI702
Credits: 02 (0-0-4)

Prerequisite
Students must have already registered for the course, "Computer Programming Lab"

Objectives
Develop problem solving ability using Programming, develop ability to express solutions to problems clearly and precisely, develop ability to design and analyze algorithms, introduce with fundamental data structures, develop ability to design and evaluate Abstract Data Types and data structures.

Learning Outcomes
Students will be capable to acquire the generic programming skills to design and implement data structures and related algorithms for a broad-based set of computing problems and real life applications.

Course Content
Searching, Sorting, Data types and representation. Abstract Data Types, Tagged, Array based, Linked, Indexed, and simulated pointer based storage. Lists, Sparse matrices List of list, doubly linked lists, Stack, Recursion removal, Queue, Dequeue, Tree, Binary Tree, K-ary Tree, Binary Search Tree, Tree traversal. Kd Tree, Quad Tree, Octree. Graphs and graph traversal.

Evaluation Plan

Lab work	40
Lab record	15
Mid sem lab –Viva/Test	15
End sem lab – Viva/Test	15
Attendance & discipline in lab	15
Total	**100**

Text Books

3. Sartaj Sahni, "Data Structures, Algorithms", Tata Mc Graw Hill, New York
4. Preiss, Bruno R., "Data Structures and Algorithms: With Object-Oriented Design Patterns in C++ ", John Wiley & Sons, New York, 2003.

Reference Books

9. Kruse, Tonso, Leung: Data Structures and Program Design in C
10. Langsam, Augestein, Tenenbaum : Data Structures using C and C++
11. Weiss: Data Structures and Algorithm Analysis in C/C++
12. Carrano and Prichard: Data Abstraction and Problem solving with C++
13. Horowitz and Sahani: Fundamental Data Structures
14. Sahani : Data Structures, Algorithms and applications in C++
15. Standish: Data Structures in Java
16. Corman et al: Introduction to Computer Algorithms

ENGINEERING MECHANICS

Course Code: 10B11CE211
Credits: 04 (3 1 0)
Prerequisites: None

Objective: The primary objective of a course on engineering Mechanics is to learn how to use the knowledge of mechanics in understanding the behavior of structures. This course serves as an introduction to structural systems, and to methods of analyzing these systems under various loading conditions.

Learning Outcomes: At the end of the course students will have knowledge of various force systems, joint systems and various day to day phenomena of mechanics.

Course Outline:
Introduction and application of Equivalent force system and equations of equilibrium.
Basic concept of force - couple system, planar force system, parallel force system, general force system
Analysis of pin jointed frames.
Friction and its application
Kinematics of particle and rigid body, Dynamics of particle and rigid body, Virtual work, Impulse and Momentum, Centroid & center of gravity, Moment of inertia
Mechanical Vibrations: Introduction, Equations of motion for single degree of freedom system, free and forced vibrations and damped vibrations. Compound springs with linear motion.

Methodology: The course will be covered through lectures supported by tutorials. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Books:

Text Books:
1. Vector Mechanics; Static & Dynamics by Beer & Johnston, TMH publication
2. Engineering Mechanics; A.K.Tayal, Umesh Publication

Reference Books:
1. Engineering mechanics, Strength of materials & Elements of Structural analysis by C Venkatramaiah & Narsimha Rao, CBS publication.

CHEMISTRY

Code: 10B11CL211
Credits: 04 (3 1 0)
Prerequisites: none
Objective: To familiarize the student with the physical chemistry, applied chemistry etc.
Learning Outcomes: Student learns the fundamental concepts of engineering chemistry.
Course Outline:

CHEMICAL BONDING & CHARACTERISTICS OF SOLIDS: Introduction to various kinds of bonding including hydrogen bonding, Crystal types (Molecular crystals, Ionic crystals, Covalent crystals, Metallic crystals – their bonding and characteristics), some characteristic crystal structures; Crystal analysis by X-Ray Diffraction **(4)**

PHYSICAL CHEMISTRY: Structure of water and anomalous behaviour, Conductivity of Electrolytes: Specific conductivity, Measurement of conductance, Conductivity water, Acid-Base equilibria, pH, Buffer Solution; Electrochemistry: Electrochemical cells, Reference electrodes, Electrochemical series; Reaction kinetics: up to second order; Solution chemistry: Concentration units, Acid-Base titration, Complexometric titration, Redox titration; Surface Chemistry: Absorption, Adsorption, Colloidal Chemistry, Ion exchange; Membrane process: Reverse Osmosis; Electrodialysis. **(12)**

APPLIED CHEMISTRY: Corrosion and its control: Types of corrosion; Galvanic series; Factors influencing corrosion and protection against corrosion; Protective coatings: Metallic coatings; Electroplating and Electroless Plating; Paints, Formulation of paints; Failure of paint film; Varnishes, Enamels, Emulsion paints, Lacquers; Metals and Alloys: Physical properties of metals; cast iron, wrought iron, steel, effect of impurities in steel; Heat treatment of steel; Alloys; purpose of making alloys; preparation of alloys; alloy steels; application of alloy steels **(12)**

CHEMISTRY OF MATERIALS: Polymers: Introduction, Specific uses of important polymers; Ceramics, Types of ceramics, Refractories; Glasses, Types of glasses, Zeolites, Clay minerals **(3)**

CHEMISTRY IN THE ENVIRONMENT: Atmospheric pollution: Composition of the atmosphere, Residence times, Sources and reactions of some of its constituents and pollutants (CO_2, NOx, SOx, CFCs), Acid rain, Smog, Ozone production and depletion, Natural and anthropogenic sources of pollution, Water pollution: Chemistry of natural waters, Water pollution due to organics (detergents, fertilizers, pesticides), Heavy metal pollutants in water, Sources, Reactions, Speciation and toxicity **(11)**

Teaching Methodology: The course will be covered through lectures and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments and actual design problems will be given.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

TEXT BOOKS:

1. P.C Jain & M. Jain 'Engineering Chemistry'
2. N. Bunce 'Environmental Chemistry' Wuerz Publishing Ltd, 1991

REFERENCE BOOKS:

1. Chemistry for environmental engineering and science, Sawyer and Maccarty TMH
2 J.D. Lee 'Concise Inorganic Chemistry'
3. B.H Mahan 'University Chemistry', 4th edn, Narosa
4. A.K De 'Environmental Chemistry'
5. I. Sethi, M.S Sethi, S.A Iqbal Environmental Pollution: Cause & Effect & Control
6. V.R Gowariker 'Polymer Science'

CHEMISTRY LABORATORY

Course Code: **10B17CL271**

Credits: **01 (0 0 2)**

OBJECTIVE: Laboratory experiments are helpful for civil engineering students for understanding the physical chemistry, applied chemistry etc.

LEARNING OUTCOMES: At the end of the course the students will have basic knowledge of chemistry its practical applications.

LABORATORY EXPERIMENTS:

1. Preparation of standard solution : NaOH.
2. Preparation of standard solution : HCl.
3. pH metric titration of : Strong acid (HCl) against Strong base (NaOH).
4. pH metric titration of : Weak acid(Oxalic acid) against Strong base (NaOH).
5. Column chromatography.
6. Determination the order of saponification of ethyl acetate with NaOH.
7. Thin layer chromatography.
8. Double titration.
9. Oxidation and Reduction titration.
10. Hardness of water by complexometric titration**.**

TEXT BOOKS:

1. Laboratory manual on engineering chemistry by S. K. Bhasin and Sudharani. Dhanpat Rai Publishing Pvt. Ltd. New delhi.

WORKSHOP PRACTICE

Course Code: **10B17CE271**
Credits: **01 (0 0 2)**
Prerequisite(s) : **No Prerequisite required**

Objective- The course provides an opportunity to students to get an exposure to various workshop practices which help in equipment and machinery design, fabrication and machinery.

Learning Outcomes: At the end of this course the student will have:

1. Hands on experience in basic workshop practices like welding, carpentry, foundry, machines shop.
2. Fair understanding of the workshop processes.

Course Content:

Carpentry Shop: Timber: Type, Qualities of timber disease, Timber seasoning, Timber preservation,

Wood Working tools: Wood working machinery, joints & joinery.Two jobs to cover above topic such as: Name Plate. Carpentry joints such as cross halving joint mortise and tennon joint, Dovetail joint etc.

Fitting Shop: Metal bench work Measuring instruments, Engineer steel rule, Surface gauges calliper, feeler
gauges, Try square and micrometer.
Use, Care and maintenance of hand tools such as hammer, Cold chisel of different type, Center punch, Hack-saw, Dot punch, Different types of files, Use of surface plate, Surface gauges, type of drills, Taps and dies for drilling tapping and screw threads.
Fitting operations: Chipping, filling, Drilling and tapping.

Two joints to cover above course such as :
Preparation of job piece by making use of filling, sawing and chipping operation.
Job having combined-practice for drilling and tapping.
Job having combined practice for drilling and reaming.

Welding:
Students are required to make three jobs related to Brazing, Soldering and welding and to know about :
Equipment used for Brazing, Soldering and gas, Arc welding.
Selection of material and flux used in brazing and soldering
Selection of welding rods, flux and pipe for gas welding.
Selection of welding machine, Electrods and current for Arc welding.
Use of tools and the equipments, Safety precautions.

Black Smithy Shop

Ferrous and Non-ferrous materials, Fe-C diagram, Smithy forges, maintenance and control of fire and fuel used in smithy shop. Use of various smithy tools such as swage block. Anvil, different types of Hammers, Tongs, Flatters, Cold set, Hot set, set hammers punches,Callipers (outside and inside).
Introduction to forging and forging methods heating metals for forging.

Forging operations:
Upsetting, Punching and drafting. Forging of chisel. Forging of C-Ring. Forging of Pan Hook (S-shaped), Forging of screw driver, Forging of hexagonal nut etc.

Foundry:
Pattern Making: Students are required to prepare four jobs related to pattern making and moulding and know about: Pattern materials, pattern allowances and types of patterns.
Core box and core print, Use and care of tools used for making wooden patterns.

Moulding*:*

Properties of good moulding and core sand, Composition of green sand, Dry sand and loam sand. Care and use of moulding tools.Attempt should be made to expose students to as many workshop practices as feasible.

Teaching Methodology-

Each workshop practice class will be preceded by theory giving a background of the operation, description of the process for helping the students in understanding the working of the equipment/tool. The students will gain skills in the operations by practice.

The evaluation procedure will involve submission of reports on the theory and practice, a written examination preceding practical examination and a oral viva voice examination

Reference Books

1. Manufacturing Processes - Chapman, Vol. I & II.
2. Production Technology - P.N. Rao., Tata McGraw hill
3. Workshop Technology - Raghuwanshi, Vol. I & II.
4. Workshop Technology- Hazara Choudhary, Vol. I & II, Media Promoters & Publishers Pvt. Ltd.

MANAGERIAL ECONOMICS

Course Code: **10B31PD311**
Credits: **03 (3 0 0)**

Course Content :

.Introduction to Managerial Economics & Macro-economic Concepts

Definition of Economics, Meaning & Scope of Managerial Economics, Micro & Macro Economics, Concept of economic profit, (Opportunity Cost), Concept of Present value.

Law of demand, Individual & market demand, Determinants of market demand, Marginal Utility theory, Elasticity of demand – Price, Income, Cross, Advertising Theory of Consumer choice using Indifference Curve analysis ,Demand forecasting techniques – Delphi , Survey , Time series analysis.

Production Theory and Analysis: Production with one variable, optimal employment of a factor of production, Cobb Douglas production function, Production with two variable inputs, Production Isoquants, Production Isocosts, Optimal employment of two inputs, the expansion path, Basics of Supply, Market Equilibrium

Cost Theory and Analysis: Cost concepts – Opportunity, Explicit, Marginal, Incremental and Sunk, Relation between Production & Cost, Short run cost function, Long run cost function, Special topics -Profit contribution analysis, - Break Even analysis, Operating Leverage

Pricing under Different Market Structures : Perfect Competition - Determination of Price output relationship in short run, long run, Monopoly - Determination of Price output relationship in short run & long run , Price discrimination ,Monopolistic Competition - Determination of Price output relationship in short run & long run , Product Differentiation ,Oligopoly -Types ,Determination of Price output relationship ,Kinky demand curve {Stickness of Price},Price leadership model

Methodology: The course will be covered through lectures supported by tutorials. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Books Recommended:

Managerial Economics – Analysis , Problems & Cases by P.L.Mehta , Sultan Chand & Sons (Text)
Managerial Economics by Craig Peterson , Pearson Education
Modern Economic Theory by K.K.Dewett {Unit 1}

NUMERICAL METHODS

Course Code: 10B11MA311

Credits: 04 (3 1 0)

PREREQUISITE(S): None

Learning outcome: After studying this course the students would gain enough knowledge to solve mathematical and physical problems.

Numerical Linear Algebra : Gauss-elimination and LU-Decomposition methods. Iterative methods : Gauss Siedel and successive-overrelaxation methods. Power method for largest eigenvalue. Jacobi's method for symmetric matrices.

Interpolation & Approximation : Interpolating polynomial. Lagrange formula with error. Formulae for equispaced points. Divided differences. Hermite interpolation. Pade and rational approximations. Least square approximation. Approximation by splines.
Numerical Differentiation and quadrature : Approximation of derivatives, Newton-cote formulae. Gauss-Legendre quadrature formulae. Romberg integration.Double integration.
Non-linear Equations : Iterative methods for one or more non-linear equations. Convergence criteria or the one-one criteria. To calculate iterative methods and the formula for the calculation of the approximation .
Numerical Solutions of ODE and PDE : Runga-Kutta and Predictor corrector methods for IVPs. Finite difference methods for BVPs. Shooting methods, Numerical solutions of parabolic, elliptic and hyperbolic partial differential equations.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Books

1. Gerald, C.F, Wheatley, P.O : Applied Numerical Analysis, 6th Ed., Pearson Education, 1999.
2. Schilling, R.J., Harries, S.L. : Applied Numerical Methods for Engineers, Thomson Brooks/Cole, 2000.
3. Smith, G.D : Numerical solution of Partial Differential Equations, 2nd Ed., Oxford, 1978.
4. Conte, S.D , de Boor,C. : Elementary Numerical Analysis, 3rd Ed., McGraw-Hill, 1980.
5. Hildebrand, F.B : Introduction to Numerical Analysis, McGraw- Hill, 1974.
6. Scheid, F. : Numerical Analysis, 2nd Ed., Schaum Series, 1989.
7. Ralston, A : A First course in Numerical Analysis, McGraw-Hill 1965.
8. Rajasekarn, S. : Numerical Methods for Science and Engineering, 22nd Ed., Wheeler, 1999.
9. Mitchell, A.R : Computational Methods in Partial Differential Equations, Wiley, 1969.
10. Ralston, A., Wilf H.S : Mathematical Methods for Digital Computers, 1967.
11. Griffiths, D.V., Smith I.M : Numerical Methods for Engineers, Oxford, 1993.
12. Chapra, S.C, Canale, R.P : Numerical Methods for Engineers, 2nd Ed., McGraw-Hill, 1989

ELECTRICAL MACHINES & INSTRUMENTATION

Course Code: **10B17EC311**
Credits: **04 (3 1 0)**
Prerequisite
Students must have already registered for the course, "Electrical circuit analysis" & Basic knowledge of electric machines, meters, electronic instrument.

Objectives Learning Outcomes
Student will be proficient to gain the knowledge of D.C, A.C Machines & measurement technique, multiphase circuit, introduction to robotics assorted electronics instruments. On achievement of course they will also have knowledge that how to measure of non electrical quantity.

Course Content
Single & three phase circuits, Transformers, Small power AC. & DC machines
Configuration & application of AC. &DC Machine
Steeper motor
Electric meters galvanometer, ammeter, and voltmeter
Transducers
Power supply
Electronic instruments

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Text Books
1. Sawhney A.K.,Sawhney Puneet Electrical and Electronic Measurements and Measuring Instruments
2. Textbook of Electrical Technology: AC and DC Machines Vol. 2 / Theraja, B.L.
3. Electrical Machines / Ghosh, Smarajit

References:
1. Electrical Machines / Mittle, V. N.
2. Theory and Problems of Electric Machines / Kothari, D. P.
3. Instrumentation, Measurement and Analysis / Nakra, B.C.

ELECTRICAL MACHINE & INSTRUMENTATION LAB

Course Code: **10B17EC317**
Credits: **01 (0 0 2)**
Prerequisite
Students must have already registered for the course, "Electrical circuit analysis lab(07B11EC701)"&Basic knowledge of electric machines, meters, electronic instrument.

Objectives Learning Outcomes
Student will be proficient to gain the knowledge of generation & measurement technique,
ADC & DAC conversion using different method. On achievement of course they will also have knowledge that how to measure of non electrical quantity.

Course Content
Measurement of pressure using pressure cell
Measurement of displacement using LVDT
Measurement of temperature using RTD
Measurement of unknown inductance using Maxwell's bridge
Measurement of unknown inductance using Hay's bridge
Measurement of unknown capacitance using shearing bridge
To generate ramp signal using Miller sweep generator
To generate ramp signal using Bootstrap sweep generator
To generate staircase signal using staircase generator
To study 4-bit digital to analog converter based on R-2R Ladder network
To study 8-bit analog to digital converter based on Successive approximation method

Text Books

1. Sawhney A.K.,Sawhney Puneet Electrical and Electronic Measurements and Measuring Instruments
2. Textbook of Electrical Technology: AC and DC Machines Vol. 2 / Theraja, B.L.
3. Electrical Machines / Ghosh, Smarajit

References:

1. Electrical Machines / Mittle, V. N.
2. Theory and Problems of Electric Machines / Kothari, D. P.
3. Instrumentation, Measurement and Analysis / Nakra, B.C.

MECHANICS OF SOLIDS

Course Code: 10B11CE311
Credits: 04 (3 1 0)
Prerequisites: none

Objective: To develop knowledge of mechanics related to solids.

Learning Outcomes: At the end of the course students will have in-depth knowledge of material responses to load and their strength properties.

Course Outline:
Simple stresses and strains: Stress-strain relationships, elastic constants and their relationships, temperature stresses. Analysis of axially loaded members: Bars of uniform, varying and tapering cross sections, composite bars.
Complex Stresses: Stresses on inclined planes, principal stresses and strains, Mohr's circle of stresses, theories of elastic failure.
Simple theory of bending, bending and shear stress distributions in beams
Bending moment and shear force diagrams, relationships between loads, shear force and bending moment.
Slope and deflection of beams: Differential equation of the deflection curve, double integration method, Macaulay's method, moment area method and conjugate beam method.
Torsion in circular shaft

Teaching Methodology: The course will be covered through lectures supported by tutorials and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Books:
Text Book:
1. Mechanics of materials by Gere and Timoshenko, CBS Publishers New Delhi
2 . Strength of Materials by Ramamutham
3. Analysis of Structures by Vazirani & Ratwani, Khanna Publishers Delhi
4. A Text Book of Structural Mechanics by R. S. Khurmi
5. Strength of Materials by B.C. Punmia
6. S.M.A. Kazioni, Solid Mechanics, 1st revised ed., Tata McGraw Hill, New Delhi, 1988.
7. E.P. Popov, Introduction to Mechanics of Solids, Prentice Hill of India, New Delhi, 1973.
8. S.H. Crandall, N.C. Dahl and T.V. Lardner, Mechanics of Solids: An Introduction, McGraw Hill International, Tokyo, 1994.

FLUID MECHANICS

Course Code: **10B11CE312**

Credits: **04 (3 1 0)**

PREREQUISITE(S): **Nil**

OBJECTIVE: To develop knowledge of properties, movement and behavior of fluid (water) under various flowing conditions

LEARNING OUTCOMES: At the end of the course students will have in-depth knowledge of fluid mechanics, measurement of fluid flow.

COURSE CONTENT:
Introduction; Definition, Types of fluid, Properties of fluid, Fluid pressure on curved & plane surfaces, Pressure measurement, Stability of floating bodies.

Kinematics of fluid flow; steady & unsteady, uniform & non-uniform, rotational & irrtotational, laminar & turbulent flow, Continuity equations for 1-D & 2-D flows, Flow-nets.

Dynamics of fluid flow; Euler's equation, Bernoulli's equation; Venturimeter, Pitot-tube, Orifice-meter, Notches & Weirs, Mouthpieces, Impulse-momentum equation, Dimensional analysis & modelling criteria.

Boundary Layer Theory; Elements of boundary layer theory. Drag & lift Airfoil theory.

Analysis of pipe flow; Laminar & Turbulent flow through pipes & velocity distribution, Darcy-Weisbach's equation, Losses in pipe sections, branching of pipes.

TEACHING METHODOLOGY: The course will be covered through lectures supported by tutorials and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

TEXT BOOK:
1. Fluid Mechanics & Hydraulics by **A.K.Jain**
2. Fluid Mechanics & Hydraulics by **Modi & Seth**
3. Open channel hydraulics by **K.Subramanya**

REFERENCE BOOKS:
1. Fluid Mechanics & Hydraulics by **Gupta & Alam Singh**.
2. Fluid mechanics & Hydraulics by **Garde**
3. Fluid Mechanics by **A.K.bansal**

FLUID MECHANICS LABORATORY

Course Code: **10B17CE372**

Credits: **01 (0 0 2)**

OBJECTIVE: Laboratory experiments are helpful for civil engineering students for understanding the flow phenomenon in pipes and channels

LEARNING OUTCOMES: At the end of the course the students will have basic knowledge of fluid mechanics and its practical applications.

LABORATORY EXPERIMENTS:

1. Determination of metacentric height
2. Calibration of a venturi meter
3. Determination of frictional losses in pipes of different diameters.
4. Determination of minor losses in pipes
5. Calibration of pitot tube
6. Calibration of a, v- notch and rectangular notch
7. Reynolds dye experiment for flow characterization
8. Determination of cc, cv and cd of an orifice
9. Verification of bernoulli's theorem
10. Calibration of orifice meter
11. Verify the impulse momentum equation (impact of jet)
12. Performance characteristics of a centrifugal pump
13. Valve characteristic

TEXT BOOKS:

1. Fluid Mechanics laboratory manual by **G. L. Asawa**
2. Fluid Mechanics & Hydraulics by **A.K.Jain**
3. Fluid Mechanics & Hydraulics by **Modi & Seth**
4. Open channel hydraulics by **K.Subramanya**

REFERENCE BOOKS:

1. Fluid Mechanics & Hydraulics by **Gupta & Alam Singh.**
2. Fluid mechanics & Hydraulics by **Garde**
3. Fluid Mechanics by **A.K.bansal**

ENGINEERING GRAPHICS AND CAD APPLICATIONS

Course Code: **10B17CE371**

Credits: **02 (0 0 4)**

Prerequisites: None

Objective: To develop knowledge of Engineering graphics and drawing.

Learning Outcomes: At the end of the course students will be able to draw and read the engineering drawings. They will also be able to work with AUTO CAD software.

Course Outline:
Introduction: Drawing Instruments and use, Letter writing, Geometrical configurations, Scales
Conic Sections
Orthographic Projections: Points, straight lines, planes, simple solids
Isometric Projections: Simple solids like cube, cylinder, prism, cone
Orthographic projections of simple machine elements like machine clamp, dovetail brackets and bearing block.
Development of Surfaces
Applications Of AutoCAD Software:
Basic terminology, Drawing commands and skills, Project Planning, 3-Dimensional drawing, Advance Tools: Template files, object snap in AutoCAD, line types, file formats, editing and modifying, Inquiry tools, X-Rays in CAD, System variables

Methodology: The course will be covered through lectures supported by labs. In labs, apart from the discussion on the topics covered in lectures, assignments in the form of exercises will be given.

Text Books
1. Engineering drawing & graphics + AutoCAD by K.Venugopal, New Age International (P) Ltd., New Delhi
2. Engineering drawing by N.D.Bhatt & V.M.Panchal, Charotar Publishing House,

FINANCIAL MANAGEMENT

Course Code: **10B11PD411**
Credits: **03 (3 0 0)**

Learning Objectives:

In today's dynamic world engineers along with taking technical decisions also have to take financial decision like long term investment decision i.e. expansion, merger& acquisition etc. , short term investment decision i.e. inventory management, receivable management etc. and so on. So they need to understand, analyze, and interpret financial data and financial issues. This course will help them in understanding the concepts and principles of accounting and finance with the support of software packages so that they can make quick informed financial decision.

Course Content:

Introduction, Scope and Objectives
Basic Financial Concept
Time value of money
Capital budgeting techniques
Cash flows
Long term sources of finances
Concept and measurement of cost of capital
Leverages, EBIT-EPS analysis
Working capital management—Inventory Management,
Financial Statement analysis

Recommended Books : **1.** Financial Management by I. M. Pandey (Text)
2. Principles of Financial Management by Douglas R. Emery, John D. Finnerty, John D. Stowe

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

STRUCTURAL ANALYSIS

Course Code: **10B11CE413**
Credits: **04 (3 1 0)**
Prerequisites: Engineering Mechanics 07B21CE101
Course objectives

- To calculate loads for structural analysis.
- To identify determinate, indeterminate, stable and unstable structures.
- To determine forces and deflections in determinate trusses, beams and frames.
- To determine forces in indeterminate trusses, beams and frames by the force method.
- To construct influence lines and be able to use them.
- To use computer tools to assist in classical structural analysis.

Learning Outcomes: Students have the ability to analyze the different type of structure and able to find out the forces.
Course Outline:
Introduction: Statically determinate & indeterminate structures.
Analysis of statically determinate structures: trusses, frames, and three hinged arches
Strain energy due to axial, bending, shear and torsion loads, Castigliano's theorem, Maxwell-Betti's theorem, Principal of virtual work, reciprocal theorem, and principal of superposition.
Analysis of plane redundant frames up to two degree of redundancy by energy method, slope deflection method and moment distribution method
Analysis of propped cantilever, fixed beam, continuous beam, and Clapeyron's three-moment theorem
Two hinged and fixed arches
Buckling of columns, critical loads, axially and eccentrically loaded columns
Rolling loads and Influence lines for beams

Teaching Methodology: The course will be covered through lectures supported by tutorials and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Text Books:
1. Basic structural analysis by C.S Reddy, Prentice Hall of India Pvt. Ltd.
2. Analysis of structures by Vazirani & Ratwani, Khanna Publishers
3. Analysis of structures by Ramamurtham

GEOTECHNICAL ENGINEERING

Course Code: 10B11CE411
Credit: 04 (3 1 0)
Course Outline:
Introduction to Geo-technical problems in Civil Engineering
Soil types and formation, simple soil properties, grain size distribution, Atterberg's limits, soil identification and I.S. classification.
Total, effective and neutral stresses, Darcy's law, permeability and capillarity of soil, seepage, flow- nets, Piping, filters and filter design.
Laboratory compaction and field compaction of soils
Stress distribution in soils under surface loadings.
Compressibility, one-dimension consolidation, simple settlement analysis
Shear strength, total and effective strength parameters and their determination.
Earth pressure: Classical theories, graphical charts
Stability of slopes

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Text Books:
1. Soil Mechanics & Foundation Engineering by Gopal Ranjan & A.S. Rao
2. Soil mechanics by Venkatrammiah
3. Soil mechanics by B.C. Punmia

Reference Books:
1.Modern Geotechnical Engineering by Alam Singh, CBS Publications
2.Soil Engineering (vol.-1) Fundamental & General Principles by Alam Singh ,CBS Pub.
3.Soil Engineering (vol.-2) Geotechnical Testing & Instrumentation by Alam Singh & Chowdhary, CBS Publications
4.Soil Mechanics by Lambe & Whitman, Wiley Publications

SURVEYING

Course Code: 10B11CE412
Credits : 04 (3 1 0)
Prerequisite: Nil
Objective: To learn the fundamentals of different types of surveys, and their applications in the field of civil engineering.
Learning outcome: At the end of course, the students shall be able to know how to use the different types of surveys in the field.
Course Outline:
Introduction: Classification of surveying, Principle of surveying. Error due to use of wrong scale.
Chain Surveying: Instruments for chaining, Errors due to incorrect chain, Chaining on sloping ground, Errors in chaining, Tape corrections, Chain triangulation, setting out right angles, Basic problems in chaining, Conventional symbols used in chaining..
Compass Surveying: Instruments (Prismatic & Surveyor compass), Bearing and angles, Magnetic declination, Local attractions, errors in compass survey
Leveling: Instruments, Optical defects in lenses, Temporary adjustment of a level, Direct leveling, Differential leveling, Reciprocal leveling, Curvature & Refraction corrections, Leveling problems, Errors in leveling, The level tube trigonometrical leveling .
Contouring: Contours, Contour interval, Contour gradient, Characteristics of contours, Methods of locating contours & their interpretation, Uses of contour maps. Calculation of areas& volumes. Planimeter, minor instruments.
Theodolite: Transit & Non-transit, Definition & terms, Measurement of horizontal & vertical angles, Fundamental lines of the theodolite and desired relationships, Sources of error.
Traverse Surveying: Methods of traversing, Traverse computations, closing errors, Balancing the traverse, Omitted measurements.
Plane Table Surveying: Instruments, Principle & methods of plane tabling, Three-point problem, Two-point problem, Errors in plane tabling, Advantages & disadvantages.
Tachometric Surveying: Instruments and Tachometric methods.
Curves: Simple circular, Compound, Reverse & Transition curves, setting out of the curves.
Photographic Surveying: Principles, Advantages of Aerial photography.
Setting Out Works: Buildings, Culverts, Bridges, Tunnels, Transferring levels underground.
Introduction to Remote Sensing, GPS, GIS and Map study

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Books:
1. Plane Surveying by A.M.Chandra (New Age International Publishers, New Delhi
2. Surveying-1, Surveying-2, by B.C.Punmia, Laxmi Publication Delhi.
3. Surveying &Leveling byN.N.Basak, Tata McGraw Hill Publishing Com. New Delhi.
Reference Books:
1. Higher Surveying by A.M.Chandra, New Age International Publishers New Delhi.
2. Plane Surveying vol-1 &vol-2 by Clark David, CBS Publishers, Delhi.
3. Surveying-3 by B.C.Punia, Laxmi Publication Delhi.

ENGINEERING MATERIALS

Course Code: 10B11CE414
Credits: 04 (3 1 0)
Prerequisite: Nil
Objective: To develop knowledge of properties of various engineering materials

Learning Outcomes: At the end of the course students will have in-depth knowledge about properties and uses of engineering materials.

Course Outline:
Soil: Application as construction material, strength & compressibility characteristics
Stones: Commonly used stones, composition, engineering characteristic & uses.
Bricks: Classification, specification, ingredients, qualities & manufacture of bricks.
Aggregates: Classification, characteristics, soundness, alkali-aggregate reaction.
Lime: Sources of lime, physicochemical properties, manufacture, application.
Cement: Raw materials, types; Portland, Pozzolanic and slag cements, physicochemical properties of Portland cement, hydration, setting, hardening and curing, manufacture of Portland cement.
Concrete: Properties of fresh concrete, mechanical properties of concrete, concrete additives, introduction to mix design.
Steel: Microstructure and mechanical properties (ductility, durability and strength) of mild steel, cold worked steel, effect of temperature, anti rusting treatment of steel, bitumen & polymer treatments.
Wood: Structure of tree, types, seasoning, decay, disease, defects, preservation.
Plastics & Polymers: Uses as building material.
Other Materials: Glass, Paints, Varnishes, Bitumen, Asbestos and Geosynthetics
.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Text Books:

1. Engineering Materials by S C Rangwala, Charotar Publishing House, Anand

2. Materials of Construction by D N Ghosh, TMH, New Delhi

Reference Books:

1. Concrete Technology by A M Neville & J J Brooks, Pearson Education, Delhi

SURVEYING LAB

Course Code: **10B17CE472**
Credits: **02 (0 0 4)**
Objective: To learn the fundamental principles and procedures to carryout different types of surveys, and their applications in the field of civil engineering.
Learning outcome: At the end of course, the students shall be able to know, how to conduct the different types of surveys in the field.

List of experiments:

1. Chain survey
2. Compass survey
3. Plane table survey
4. Simple leveling
5. Profile leveling
6. Longitudinal & Cross section
7. Contouring
8. Theodolite
9. Tachometry
10. Areas & Volumes
11. Traversing
12. Trigonometric leveling.
13. Total station

Teaching Methodology:

Instrument	Duration	Marks
Evaluation-1	1 hour	15
Evaluation-1	1 hour	15
Continuous Evolution		70
Total marks:		**100**

Books:

1. Agor, R. “Surveying”, Vol. I & II Khanna Publications, Delhi,.
2. Arora, K.R., “Surveying” , Vol. I & II Standard Book House, Delhi,
3. Bannister, A. and Baker, R., “Solving Problems in Surveying”, Longman Scientific Technical, U.K., 1994.
4. Kennie, T.J.M. and Petrie, G., “Engineering Surveying Technology”, Blackie & Sons Ltd., London, 1990.
5. Punmia, B.C., “Surveying”, Vol. I & II, Laxmi Publications New Delhi,
6. Duggal, S.K., Surveying Vol. I & II TMH
7. Basak, Surveying TMH.
8. Kanetkar, Surveying Vol. I, II
9. Chandra, A.M. “Plane Surveying”, New Age International Publishers, Delhi
10. Chandra, A.M. “Higher Surveying”, New Age International Publishers, Delhi

GEOTECHNICAL LAB

Course Code: **10B17CE471**
Credit: **02 (0 0 4)**
List of Experiments

1. Field Identification Test
2. Specific Gravity of soil particles by Pycnometer method
3. Specific Gravity of soil particles by Density bottle method
4. Particle size distribution of soils (Grain size analysis) by Sieve analysis for course-grained soils
5..Particle size distribution of soils (Grain size analysis) by Hydrometer analysis for fine grained soil
6. Determination of Atterberg's limits (Consistency limits) for Non Swelling type soils
   a) Liquid Limit b) Plastic Limit c) Shrinkage limit
7. Determination of Atterberg's limits (Consistency limits) for Swelling type soils
   a) Liquid Limit b) Plastic Limit c) Shrinkage limit
8. Determination of density of soils by Core cutter method
9. Determination of density of soils by Sand replacement method
10. Determination of density of soils by Water displacement method
11. Determination of permeability of soils by Variable head method
12. Determination of permeability of soils by Constant head method
13. Soil compaction test (Density moisture relations)
14. Determination of Moisture Content and its variation with drying duration
15. Determination of moisture content by rapid moisture meter

EVALUTION SCHEME

Total Marks	**100**
Marks Distribution	
Continuous evaluation	70
1. Attendance	
2. Record submission	
3. Regularity, sincerity and viva	
Mid- Sem Lab. Exam	15
End –Sem Lab. Exam	15

ENVIRONMENTAL STUDIES

Course Code: **10B11GE411**
Credits: **03 (3 0 0)**

The Multidisciplinary nature of environmental studies: Definition, scope and importance, Need for public awareness, Types of Ecosystems, World Biomes, Ecosystem functioning, Biogeochemical cycles.

Natural resources, their consumption & Protection: Water, Land Energy (Renewable, non-renewable, wind, solar, hydro, Biomass), Mineral, Forest, & Food resources, Role of an individual in conservation of natural resources, Equitable use of resources.

Pollution- a threat to environment: Air, Water & Land pollution, sources & causes, Space pollution, causes & effects, toxicity limits of pollutants. Critical issues concerning global Environment (Urbanization, population growth, global warming, climate change, acid rain, ozone depletion etc.) and the Roots in: Cultural, Social, Political, Commercial, industrial, territorial domains.

Biodiversity loss: Diversity of flora and fauna, species and wild life diversity, Biodiversity hotspots, threats to biodiversity

Environmental Impact assessment: Objectives of impact assessment, Study of impact parameters, Methods for impact identification, Economics.

Environmental standards & Quality: Air, Water & Soil Quality, Pollutant sampling, pollution control systems.

Sustainable building, Urban planning, Disaster Management and Contingency Planning, Modern safety systems.

Sustainability & Planned reversal of human destruction to environment: redevelopment of brown fields, energy plantations, social forestry, engineering aspects of Re-use & Recycling, biogas for marginal income groups, organic farming, eco-consumerism, dematerialization, green technologies, eco-tourism.

Regulation of technology and innovation, Policy and law: Environmental Laws & Regulations (Different Acts – Environmental Protection Act, Air and Water Acts, Wildlife and Forest Acts), US-EPA, National

Environmental Policy; Function of pollution control boards (SPCB and CPCB), their roles and responsibilities, Eco-mark Scheme, Laws relating to Urbana and Rural land use, Ethics

Case studies: Industry – Environment interface
Field Work: Explore the surrounding flora & fauna (Study of common plants, insects, birds document environmental assets), documentation of industries in local region and their possible effects, measure of water, air and land quality, Visit to a local polluted site-Urban/Rural /Industrial / Agricultural, Study of simple ecosystems-pond, river, hill slopes etc

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35

Continuous Evaluation	25
Total marks	**100**

SOCIAL & LEGAL ISSUES

Course Code: **10B11PD511**
Credits: **03 (3 0 0)**

OBJECTIVE

Advancement in technology often comes with unexpected issues and unintended consequences. Thus the main objective of this course is to help students grapple with the social, legal and ethical issues that arise in an increasingly technology- rich society & inform them about criminal activity on the internet. The course shall eventually navigate students through legal & ethical issues related to technology on their own.

LEARNING OUTCOMES:

At the end of the course the students

- Understand the ethical, cultural & social issues related to technology.
- Practice responsible use of technology systems, information & software.
- Develop positive attitudes towards technology uses that support lifelong learning & productivity.

CONTENTS:-

CHAPTER 1: Introduction to Indian Law

- Company Act
- Consumer Laws
- Laws of Patent

CHAPTER 2: Ethics

- Business Ethics & Values
- Codes of Ethics & Professional Conduct
- The place of Code of Ethics for an Engineer
- Ethics in Bio-Tech
- Environmental Ethics

CHAPTER 3: Corporate Governance

- Role of Board of Directors
- The role of Top Management
- Executive Compensation
- Legal Provisions and SEBI Code
- Governance mechanism and ethical behavior
- Corporate Governance in India
- Impact of internet on Corporate Governance

CHAPTER 4: Intellectual Property & Cyberspace

- Intellectual Property Issues: (What is Intellectual Property, Copyright Law & Software Copyright)
- Copyright in Cyberspace
- Offensive speech in Cyberspace (Libel, pornography, censorship, Bomb-making Information, Harassing Speech Online)
- Liability of service providers

CHAPTER 5: Cyber crimes and the Laws (7 Hrs)

- Computer Crimes (Fraud and Embezzlement, Sabotage & Information Theft, Intruders, Hacking & Cracking)

- Computer Crime Laws
- Digital Forgery
- Cyber Terrorism
- Wiretapping

CHAPTER 6: IT Laws

- IT Act 2000
- ICE Bill

BOOKS FOR REFERENCE:

1. Cyber and E-Commerce Laws with information Technology Act, 2000 & Rules there under by Parag Diwan & Shammi Kapoor
2. Intellectual Property Law by P. Narayanan

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

HIGHWAY ENGINEERING

Course Code: **10B11CE511**
Credits : **04 (3 1 0)**

Prerequisite: Surveying,
Objective: To learn the fundamentals for designing of highway and to implement them for developing a computer based system for fast and efficient design.
Learning outcome: At the end of course, the students shall be able to design the highway along any given existing or new highway area.
Course Outline:
Importance of transportation, different modes, characteristics & Scope of highway engg in India,
Highway development in India, classification of roads, planning surveys, highway planning in India.
Highway alignment, engineering surveys, drawings and report, realignment.
Geometric design: Introduction cross section elements, sight distance, design of horizontal and vertical alignment of highways.
Traffic Engineering: Introduction, characteristics, traffic operation. , design of intersections, parking facilities, and lighting, traffic planning.
Highway materials: sub grade soil classification, evolution of soil strength, modulus of sub grade reaction, C.B.R test, tests for road aggregate, types of bituminous materials, tests on bitumen. Bituminous paving mixes, marshal method of mix design,
Pavement Design: types of pavements, design factors, design of flexible pavements by G.I method, C.B.R. method, Burmister's method, design of rigid pavements by using I.R.C.Recommendations.
Highway construction: construction of earth roads, gravel roads, W.B.M. roads, bituminous roads, and Cement concrete pavement, joints in concrete pavement.
Highway maintenance: Flexible &rigid Pavement failures, maintenance of bituminous surfaces,& cement concrete pavements, strengthening of existing pavements, overlay design by Benkelman beam deflection studies. Surface &sub surface Drainage of pavements.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Text Books:
1. Highway Engineering by 'A.K.Justo & S.K.Khanna' Nemchand Publ. Roorkee.
2. Transportation Engineering, An Introduction by 'C.Jotin Khisty & B.Kent Lall; PHI,
3. IRC codes and Manuals
References:
1. Traffic engineering & transportation planning, L.R.Kadiyali, Khanna Publishers, Delhi (1997)
2. Traffic and Transportation engineering by 'Animesh Das and P. Chakraborty', PHI 3.Principles of Urban Transportation System Engineering, B.G.Hutchinson', TMG, Publication
4. Principles and practices of Highway engg, L.R.Kadyali & N.B.Lal, , Khanna Publishers, Delhi (2006)
5. Principles of pavement design, Yoder.E.J,& witezac, John wiley &sons ,U.S.A

DESIGN OF CONCRETE STRUCTURES

Course Code: **10B11CE512**
Credits: **04 (3 1 0)**
Prerequisites: Structural Analysis 07B41CE101

Course objectives

The objective is to have students understand primary mechanisms of behavior and the basic criteria for design of simple reinforced concrete beams, columns and slabs.

Learning Outcome

After completing the course students will able to understand:

- define service criteria and factored strength criteria for acceptance of basic reinforced concrete members;
- understand where and why reinforcing steel should be placed in members during reinforced concrete construction;
- perform basic shear, bending, and bending-axial capacity analysis and define preliminary design size requirements for basic members

Course Content

Introduction to the design of Concrete structures; Working & Limit state concepts.
Limit state Analysis; Design of beams for flexure, bond, shear and torsion (singly & doubly reinforced, T-beams & L-beams); axially and eccentrically loaded Columns; One and two-way Slabs, Stair cases; Footings, isolated and combined; Retaining wall;

Methodology: The course will be covered through lectures supported by tutorials. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Lab (70% continuous evaluation, 30 % final lab Exam)

Text Books:

1.Limit state design by A.K.Jain, Nem Chand & Bros., Roorkee
2.Limit state design of reinforced concrete by P.C. Varghese, Prentice Hall of India
3.Design of concrete mixes by Krishna Raju, CBS Publications

Reference Books:

1.Reinforced Concrete Design by Wang & Salmon
2.BIS code of practice for Plain & Reinforced Concrete - IS 456
3.BIS code of practice for design loads (other than earthquake) for buildings & structures IS 875: Part I-V
4.Criteria for earthquake resistant design of structures - IS 1893

DESIGN OF HYDRAULIC STRUCTURES

Course Code: **07B51CE301**

Credits: **04 (3 1 0)**

PREREQUISITE(S): **Fluid Mechanics**

OBJECTIVE: To develop the in depth knowledge of various hydraulic structures and their design

LEARNING OUTCOMES: At the end of the course the students will have knowledge of open channel hydraulics and will be able to design various hydraulic structures.

COURSE CONTENT:

Open channel flow; Steady state flow, Uniform flow, Critical flow, Analysis of Rapidly Varied Flow & Gradually Varied Flow, Hydraulic jump, Channel transitions

Diversion Head Works; Weirs and Barrages - Layout of a diversion Head work and its components - Failures of hydraulic structures founded on pervious foundations - creep theory for seepage flow - (Bligh's Lacey's and Khosla's)

Storage works; Design of gravity dams : modes of failure and criteria for structural stability of gravity dams - Diversion problems in dam - construction of Galleries - joints – foundation treatment - Types of earthen dams - methods of construction - Causes of failure of earthen dams , Seepage Analysis - seepage control in Earthen dams.

Spillways; Spillway types, control concepts, overflow, side channels, shaft and siphon spillways, chutes, cavitations, aeration

Maintenance of Hydraulic structures; Types, procedure, charts, Annual maintenance.

TEACHING METHODOLOGY: The course will be covered through lectures supported by tutorials and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

TEXT BOOK:

1. Garg, S.K., Irrigation Engineering and Hydraulic structures, Khanna Publishers, 1997.
2. Sahasrabudhe, S.R., Irrigation Engineering and Hydraulic Structures, Katson Publishers, 1994.

REFERENCE BOOKS:

1. Punmia, B.C., Irrigation and Water Power Engineering, Lakshmi Publications, Delhi.

CONSTRUCTION TECHNOLOGY AND MANAGEMENT

Course Code: **10B11CE515**
Credits: **04 (3 1 0)**

Prerequisites: none
Course Objectives: The objective of the Construction technology & management course is to provide graduates with knowledge and skills that are valued and sought by the construction industry profession.
Learning Outcomes: Students have the ability to carryout planning & scheduling of various civil engineering projects.

Course Outline:
Introduction to various operations in construction, execution and management Standard and special construction equipments, heavy earthmoving equipments, shovels and cranes, crushing plant, batching plant, bitumen plant
Techniques and equipments for concreting, tunneling, road pavement, dewatering, drilling, blasting and grouting
Selection of construction equipment, cost of owning and operating, capacity and utilization, breakdown analysis, economic life, replacement of equipment and sinking fund
Form works, their design, fabrication and uses
Uses and design of scaffoldings
Steel constructions; fabrication and erection techniques

Teaching Methodology: The course will be covered through lectures supported by tutorials and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Books:
Text Books:
1. Construction Equipment and Management by S C Sharma, Khanna Publishers
2. Construction Planning & Management by U K Shrivastava, Galgotia Publications
3. Construction Equipment & Planning and Application by Mahesh Verma,

Reference Books:

1. Construction Planning, Equipment & Methods by Peurifoy, TMH
2. Balters, A.Network for Planning and Scheduling, McGraw Hill Co., London, 1975.
3. R.L. Peurifoy, Constructions Planning Equipments and Materials, McGraw Hill Co., 1975.
4. J.L. Reggs. Engineering Economics, McGraw Hill Co., 1976.
5. D. Miles, Techniques of Value analysis and Engineering, McGraw Hill co., 1970.

HIGHWAY ENGINEERING LAB

Course Code: **10B17CE571**
Credits: **01 (0 0 2)**

Objective: To learn the fundamental & testing procedures of highway materials.
Learning outcome: At the end of course, the students shall be able to know the highway material testing procedures and their suitability for highways according to standards.

List of experiments:
1. Aggregate crushing strength test.

2. Los angeles abrasion test.

3. Aggregate impact test.

4. Flakiness index & elongation index test.

5. Penetration test.

6. Ductility test.

7. Viscosity test.

8. Softening point test.

9. Flash &fire point test.

10. Determination of bitumen content by centrifuge extractor.

11. Determination of marshal stability value.

12. Determination of rebound deflection of pavement by Benkelman beam.

Teaching Methodology:

Instrument	Duration	Marks
Evaluation-1	1 hour	15
Evaluation-1	1 hour	15
Continuous Evolution		70
Total marks:		**100**

Books
1. Highway Engineering by S. K. Khanna & C.E.G.Justo.
2. Airport Planning & Design by S. K. Khanna, M. G. Arora & S. S. Jain.
References
1. Transportation Engineering by L. R. Kadiyali.
2. Highway Engineering by S. K. Sharma
3. Principles of Transportation Engineering by P. Chakraborty & A. Das.

CONCRETE LABORATORY

Course Code: **10B17CE572**
Credit: **01 (0 0 2)**
Objective: Students will learn about cement hydration, material properties, and making concrete.
Learning outcome: In the end of the lab student can able to understand

- Importance and widespread uses of concrete.
- Component materials used to make concrete.
- Macroscopic structure of concrete.
- Role of water in the preparation of a concrete mixture.
- Role of water in the hardening of concrete.
- Effective ratios of component materials in various concrete structures.
- Effect of **porosity** and **aggregates** on the strength of concrete.
- Various test concrete.
- Derivation of an optimum ratio of component materials for different concrete Applications.

Laboratory Experiments:

1. To determine the quantity of water for cement paste for normal consistency
2. To determine initial and final setting time of cement
3. To determine the fineness, specific gravity and unit weight of cement
4. Determination of tensile and compressive strength of cement
5. To determine fineness modulus of fine and coarse aggregate
6. To determine compressive strength of nominal mix concrete of a given grade
7. To determine the modulus of rupture of concrete
8. Workability of concrete by various methods
9. To determine the split tensile strength of concrete of given mix proportions
10. To determine the percentage bulking of fine aggregate
11. To determine soundness of given cement by Le-Chatelier method
12. Effect of water cement ratio on strength of concrete
13. Concrete mix design

Book/Reference:
Concrete Technology: M S Shaety
Concrete Technology: Neville
Concrete: S N Sinha

COMPUTER AIDED PLANNING AND COSTING

Course Code: **10B17CE573**
Credits: **02 (0 0 4)**
Prerequisite: Engineering drawing,
Objective: To learn the fundamentals of planning, designing and estimation of different types of civil engineering structures.
Learning outcome: At the end of course, the students shall be able to know about planning, Drawing and estimating of different types of civil engineering structures by manually and by using computer assistance.

Course Outline:

Planning of Residential, Commercial, Educational and Hospital buildings by considering different aspects like .site , climatic, utility, Vastu & architectural, financial etc,municipal town planning rules &regulations,
The Units of measurements and payments for various items of works and materials Methods of estimating, estimating steps, estimating of buildings, different types of roofs, sanitary and water supply works, road works, culverts,bridges,wells, and irrigation works,
Types of estimates: preliminary and detailed estimates, contingies, administrative approval,
Analysis of rates; factors affecting the rate analysis, material and labour requirements for different types of work, rates of materials &labour. Estimate the unit rate for different items.
Estimating of quantities of materials and transport,
Specifications, rules and methods of measurement.

Autocad/3 D home: Draw the plan, elevation, section and views of different civil engineering structures by using 3D home/AutoCAD software and check the estimation done manually by using MS-Excel.

Drawing work: Plan, elevation, section and views of residential buildings, different types of roofs, sanitary and water supply works, road works, culverts, bridges, wells, and irrigation works..Etc

Teaching methodology:

Instrument	Duration	Marks
Evalution-1	1 hour	15
Evalution-2	1 hour	15
Continuous evolution		70
Total marks		**100**

Books:

1. 'Planning and designing of Residential building' by Raj Rao, Standard book publisher
2. 'Estimation and costing in Civil Engineering', by B.N.Dutta,
3. 'Text book of Estimating and Costing' by G.S.Birdie
4. 'Estimating costing and Specifications in Civil Engg.' By M .Chakraborty
5. 'Civil Engineering Building Drawing' by Gurucharan Singh

WATER SUPPLY ENGINEERING

Course Code: **10B11CE514**
Credits: **04 (3 1 0)**
Prerequisites: none
Objective:

The objective of this course is to familiarize the students with the basics of water quality and its treatment methods, importance of planning and execution of modern water supply schemes.

Learning Outcomes:

Students will be able to collect information, Plan treatment plant, design and prepare the water supply projects.

Course Outline:

Introduction: Importance of planned water supplies; financing, planning and execution of modern water supply schemes.

Water demands: Various types of demands; the per capita demand: variations in demand; design periods; population forecasting by various methods.

Sources of water: Kinds of water sources and their characteristics; factors governing the selection of a source of water supply; storage capacity of impounded reservoir.

Quality of water: physical, chemical and biological characteristics of water, common water born diseases, standards of purified water for various purposes.

Treatment of water: screening and types; aeration units; sedimentation; sedimentation tanks and their types; sedimentation aided with coagulation; classifications of filters and their constructional and operational details.

Disinfection: Methods of disinfection; chlorination and its types.

Water softening: Importance of water softening; lime- soda process; zeolite process.

Miscellaneous treatment methods: Removal of colour, odour and taste, iron and manganese; fluoridation and defluoridation.

Collection and Distribution of water: Intakes and their design for lakes, streams and rivers; methods of distribution; concept of service and balancing reservoirs; capacity of distribution reservoirs; Design of water distribution systems; analysis of pipe networks by Hardy Cross method, equivalent pipe method, method of sections and Newton-Raphson method; Layout of distribution system; the house water connection; construction and maintenance of distribution systems.

Pipes-Joints-Fittings: various types of conduits; testing and inspection; joints in pipes; valves in pipe line.

Pumps and pumping stations: Types of pumps and their choice; pumping stations; economical diameter of rising main; hand pumps; pump testing; Water hammer and its control measures.

Planning and preparing water supply projects.

Teaching Methodology:

The course will be covered through lectures followed by tutorials on the topics covered in the lecturers. Students will be given assignments on the theoretical as well as numerical portions of the subject.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Text Books:

1. Water Supply Engineering by S.K. Garg, Khanna publishers.
2. Water Supply, Waste disposal and Environmental pollution Engineering by A.K. Chatterjee, Khanna publishers.
3. Water Supply and Sanitary Engineering by Birdie, Dhanpat Rai Publications.
4. Environmental Engineering by Peavy, Rowe and Tchobanoglous, McGraw-Hill international editions.

Reference Books:

1. Manual on Water Supply and Treatment, C. P. H. E. E. O., Ministry of Urban Development, Government of India, New Delhi
2. Water Supply and Sewerage by Steel and McGhee
3. Introduction to Environmental Engineering by Davis and Cornwell
4. Water Supply and Wastewater Disposal by Fair and Geyer
5. Water Supply and Treatment and Sewage Treatment Vol. I and II by Kshirsagar
6. Water Supply and Wastewater Engineering Vol. I and II by Punmia
7. Introduction to Environmental Engineering and Science by Masters
8. Water Supply Engineering by Kshirsagar
9. Textbook of Environmental Engineering by Rao

ENVIRONMENTAL ENGINEERING LAB-1

Course Code: **10B17CE574**
Credits: **01 (0 0 2)**

Objective:

To determine the physical, chemical and biological quality of given water sample.

Learning outcome:

At the end of the course, the student shall be able to judge the suitability of water for drinking purposes.

List of experiments:

1. To determine *pH*, *turbidity*, electrical *conductivity* of the given sample.
2. To determine the *acidity* and *alkalinity* of the given water sample.
3. To estimate the content of *chlorides* in the given water sample.
4. To determine the *total hardness*, calcium and magnesium in the given sample.
5. To find the amount of S*ulphates* in the given water sample.
6. To determine the *Fluoride* in the given water sample.
7. To find out *Nitrate nitrogen* present in a given water sample.
8. To determine the optimum *coagulant dose* quantity for given sample of raw water.
9. To determine chlorine demand and residual chlorine.
10. To determine *most probable number* (MPN) of coliforms of the given sample.
11. Field visit of water treatment plant.

Teaching Methodology:

Instrument	Marks
Evaluation-1	15
Evaluation-2	15
Continuous Evaluation	70
Total marks:	**100**

Text Books:

1. Environmental Engineering laboratory manual by Kotaiah and Kumaraswamy, Charotar publishing house, Anand, India.
2. Water and Wastewater Testing by Mathur, New chand & bros (publishers) Roorkee.
3. Chemistry for Environmental Engineering by Sawyer, McCarty and Parkin, McGraw Hill, New York

Reference Books:

1. Standard Methods for the Examination of Water and Wastewater by A.P. H.A., Washington
2. A manual on water and wastewater analysis by NEERI, Nagpur.
3. Analysis of water and wastewater, BIS publications, New Delhi.

PROJECT MANAGEMENT

Course Code: **10B11PD711**
Credits: **03 (3 0 0)**

Content:

- Project Management
  - Concepts
  - Project Life Cycles
  - Role & Responsibilities of Project Manager
- Project Selection – Criteria and Models
- Project Planning
- Project Strategy
  - Risk Management
  - Budgeting
  - Cost Estimates
- Project Scheduling
  - Network Techniques (PERT, CPM)
  - Gnatt Charts
- Resource Allocation
- Monitoring & Information System
- Project Control , Auditing
- Process Improvement

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Recommended Books

1.	Prasanna Chandra (Text)	Projects	TMH
2.	John.M.Nicholas	Project Management	Pearson
3.	P.K.Joy	Total Project Management : Indian Context	Macmillan
4.	Randolph & Posmer	Effective Project Planning & Management	Prentice Hall

DESIGN OF STEEL STRUCTURES

Course Code: **10B11CE611**
Credits: **04 (3 1 0)**
Prerequisites: Structural Analysis 07B41CE101
Course objectives

To provide a basic understanding of the mechanical properties and types of steels used in civil structures, and to develop technical competence in the design of tension and compression members, beams, and simple bolted and welded connections.

Learning outcome:

Students understand the design a steel structural system (usually a steel truss) as part of a project.

Course Outline:

Structural steel and their properties, rolled steel sections
Permissible stresses, working stresses, factor of safety, design loads
Simple connections: Riveted, bolted and welded
Design of tension members
Design of axially loaded compression members and built-up columns
Design of beams, plate girders.
Estimation of Wind & Earthquake forces for towers
Methodology: The course will be covered through lectures supported by tutorials. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Books:
1.Design of Steel Structure by L S Negi, TMH
2.Design of Steel Structure by S K Duggal, TMH
Reference Books:
1.Design of Steel Structure (Vol-I, II) by Ramchandra
2.BIS code of practice for general construction in steel - IS 800
3.BIS code of practice for design loads (other than earthquake) for buildings & structures IS 875: Part I-V
4.Criteria for earthquake resistant design of structures - IS 1893

ENVIRONMENTAL ENGINEERING

Course Code: 07B61CE102

Credits: 04 (3 1 0)

PREREQUISITE(S): NONE

OBJECTIVE:

The objective of this course is to give the students the basics of water quality and its treatment methods, wastewater characteristics, its treatment and disposal. This course also provides the basic knowledge of air pollution, noise pollution and other environmental problems and ecology.

LEARNING OUTCOMES:

1. The students will be able to identify and demonstrate a working knowledge of the domain of water and waste water treatment.
2. The students will be able to identify and demonstrate a working knowledge of air pollution, noise pollution and other environmental problems and ecology.

COURSE CONTENT:

Basic concept & objects of Environmental technology, Population forecasting and water demand estimation, variation in water demand, Sources of water, Water Intakes, Transportation of water & wastewater: pipes and pumps, Water Quality: impurities, quality standards, Water treatment : methods and their selection, Distribution systems

Introduction to sewage, sewage systems, estimation of design sewage discharge, peak drainage discharge Quality and characteristics of sewage: Decomposition of Sewage (N,C & S cycles); physical, chemical & biological characteristics of sewage Treatment of sewage: Basics of primary, secondary and tertiary treatment, Thickening, digestion, dewatering and disposal of sludge. Introduction to treatment of industrial wastewater, Disposing of sewage effluents, Hazardous waste

Brief introduction of Air pollution & Noise pollution, standards and control technologies.

Earth and Environment: lithosphere, atmosphere, hydrosphere, ecology, ecosystem & their interaction with environment.

TEACHING METHODOLOGY

The course will be covered through lectures followed by tutorials on the topics covered in the lectures. Students will be given assignments on the theoretical as well as numerical portions of the subject

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

BOOKS & REFERENCES:

Text Books:

1.Environmental Engineering by Peavy Rowe, TMH
2.Water Supply by S.K.Garg, Khanna Publishers
3.Sewage Disposal and air pollution engineering by S.K. Garg, (Khanna Publishers)
4..Basic Environmental Technology by Jerry A. Nathanson

Reference Books:

1.Chemistry for environmental engineering and science, Maccarty TMH

2.Wastewater Engineering by Metcalf Eddy, TMH
3.Standard methods for examination of water & wastewater, AWWA
4.Wastewater treatment for pollution control by Archievala, TMH

FOUNDATION ENGINEERING

Course Code: 10B11CE612
Credit: 04 (3 1 0)
Course Outline:
Foundation requirement, types and selection, methods of determining bearing capacity of shallow foundations
Settlement considerations; allowable, total and differential settlements, estimation of settlement of structures

Eccentrically loaded footings
Raft foundation; types, design principle of rigid raft foundation
Pile foundation; types, pile load capacity, static and dynamic formulae, pile load test, pile groups; load capacity and settlement
Well and Cassion foundation: stability analysis and bearing capacity
Sheet Pile Walls & Bulk Heads: types and analysis
Strutted Excavations and Bracing
Ground Improvement Techniques: compaction, stabilization and soil reinforcement
Site Investigation and Soil Exploration
Machine Foundation: types of machine foundations design criteria and design of block foundation.

Term Work:
Computer programming for estimation of bearing capacity of shallow and deep foundations, eccentrically loaded footing

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Text Books:
1. Geotechnical Engineering by Venkatrammaiah, New Age International Publishers
2. Basic and Applied soil Mechanics by Gopal Ranjan & Rao, New Age International Publishers
3. Soil Mechanics & Foundation Engineering by K R Arora, Standard Publishers New Delhi

Reference Books:
1. Foundation Engineering by E. Bowles,
2. Foundation Design and Construction by Tomlinson, Prentice Hall
3. Design Aids in Soil Mechanics & Foundation Engineering by Kaniraj, TMH
4. Geotechnical Engineering by S.K. Gulhati & Datta, TMH

TRANSPORTATION ENGINEERING

Course Code: 10B11CE614
Credits: 04 (3-1-0)
Pre requisite: Highway Engineering

Objective: To learn the fundamentals of railways, airways, water ways & other minor modes of transportation modes. .
Learning outcome: At the end of course, the students shall be able to know about significance, fundamental knowledge of all the types of transportation modes.
Course content:
RAILWAYS:
History of railways in India, alignment and project reports, permanent way and track materials, geometric design, railway points and crossings and junction, track laying, track drainage, station yards, maintenance of track.
AIR PORTS:
Development of air transport in India ,airport planning, air port design standards, terminal lay out & classification, Design of air port pavements, drainage, marking &lighting, heliports, air traffic control, air cargo, accidents in the air, maintenance of air ports .
DOCKS, HARBOURS &INLAND WATER WAYS:
Historical development in India , tides, winds & waves, docks, harbours, break waters, jetties, landing stages & wharves, dry docks, transit sheds, cargo handling, , inland water transport. Maintenance.
MINOR MODES OF TRANSPORTATION:
Pipelines, elevators, belt conveyors, aerial rope ways, & under sea transportation.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Books:
1. Railway engineering, Subhash.C.Saxena & Satyapal Arora, Dhanpat rai &sons,(1995)
2. Railways, bridges &tunnels, Vazirani. V.N, Chandola.S.P, Khanna publications, New Delhi (1997)
3. Air port planning &design, .Khanna.S.K, Neem chand publications, Roorkee, (1999)
4. Docks &harbors, Levison Francis, Clarendon press,(2006)

SEWAGE TREATMENT AND DISPOSAL

Course Code: **10B11CE613**

Credits: **04 (3 1 0)**

PREREQUISITE(S): NONE

OBJECTIVE:

The objective of this course is to give the students the basics of sewage characteristics, its treatment and disposal.

LEARNING OUTCOMES:

1. The students will be able to identify and demonstrate a working knowledge of the domain of waste water treatment.

Course Outline:

Collection of sewage:
Importance of sanitation, Systems of sewerage – separate, combined and partially separate. Quantity of sanitary sewage and variations. Shapes of sewer – circular and egg shaped. Design of sewers, self-cleansing velocity and slopes, Construction and testing of sewer lines. Sewer materials. joints and appurtenances.

Sewage Characterization:
Quality parameters- BOD, COD, Solids, D.O., Oil & Grease. Indian Standards for disposal of effluents into inland surface sources and on land.

Sewage Treatment:
Objectives, sequence and efficiencies of conventional treatment units. Preliminary treatment, screening and grit removal units. Theory and design aspects of primary treatment, secondary treatment- activated sludge process & its modifications, Tricking filter, sludge digestion and drying beds.
Stabilization pond, aerated lagoon, UASB process , septic tank and Imhoff tank. .

Disposal of Sewage:
Disposal of sewage by dilution – self-purification of streams. Sewage disposal by irrigation (sewage treatment).

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Recommended Books:
1. Waste Water Engineering: Metcalf and Eddy.
2. Sewage and Sewage Treatment: S.K. Garg.
3. Sewage and Sewage Treatment: S.R. Krishansagar.
4. Waste Water Engineering: B.C. Punmia.
Manual on Sewerage and Sewage Treatment: Ministry of Urban Dev., New Delhi.

ADVANCED STRUCTURAL ANALYSIS

Course Code: **10B11CE615**

Credits: **04 (3 1 0)**

PREREQUISITE(S): NONE

OBJECTIVE:

The objective of this course is to enable the students to carry out structural analysis of framed structures using latest methods and program them.

COURSE OUTLINE:

Virtual Work Principles Based on Virtual Displacements

Virtual Work, The Principle of Virtual Displacements, Virtual Displacements of a Particle and External Virtual Work, Virtual Displacements of a Deformable Body and Internal Virtual Work

Matrix Methods of Analysis for Discrete Structures

Flexibility and Stiffness matrices and their generation, Concept of stiffness method, types of skeletal structures, degree of freedom, Stiffness matrix for: Truss elements, Beams in 1-D, 2-D and 3-D,

Formation of the Global Analysis Equations, The General Assembly Procedure, Applying Boundary conditions and Calculating Support Reactions

Analysis of simple plane trusses and plane frames with stiffness matrix method

Programming of Direct Stiffness Analysis of simple 2D framed Structures

Introduction to Finite Element Method

Finite Element Approach to Structural Analysis, Basic steps of finite element method for structural analysis, types of elements, shape functions.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Text Books:

1. Computational Structural Mechanics, Rajasekaran, PHI
2. Matrix Method of Analysis of Framed Structures by Weaver and Gere, CBS Pub.
3. Basic Structural Analysis by C.S. Reddy, Tata McGraw Hill

Reference Books:

4. Rubinstein, M. F., Matrix Computer Analysis of Structures, Prentice-Hall, Englewood Cliffs, N. J., 1966.
5. Beaufait, F. W., Rowan, W. H., Jr., Hoadley, P.G., and Hackett, R. M., Computer Methods of Structural Analysis, Prentice-Hall, Englewood Cliffs, N. J., 1970.
6. Wang, C. K., Matrix Methods of Structural Analysis, 2nd Ed., International Textbook, Scranton, Pa., 1970.
7. Desai, C. S., and Abel, J. F., Introduction to Finite Element Method, Van Nostrand Reinhold, New York, 1972.

ENVIRONMENTAL ENGINEERING LAB-II

Course Code: **10B17CE673**
Credits: **02 (0 0 4)**

Objective: To determine the physical, chemical and biological quality of given water sample.
Learning outcome: At the end of course, the student shall be able to judge the suitability of water for drinking purposes.

List of experiments:

1. To determine *pH*, *turbidity*, electrical *conductivity* of the given sample.
2. To determine the *acidity* and *alkalinity* of the given water sample.
3. To estimate the content of *chlorides* in the given water sample.
4. To determine the *total hardness*, calcium and magnesium in the given sample.
5. To determine the *fluoride* in the given water sample.
6. To determine the *solids* (total, suspended and dissolved) of the given sample.
7. To find out total *settleable solids* (by Imhoff Cone) in the given water sample.
8. To determine the optimum *coagulant dose* quantity for given sample of raw water.
9. To determine chlorine demand and residual chlorine.
10. To find the quantity of *dissolved oxygen* and *biochemical oxygen demand* (BOD) present in the given water sample/sewage sample.
11. To find out *chemical oxygen demand* (COD) of the given wastewater sample.
12. To determine *most probable number* (MPN) of coliforms of the given sample.
13. To determine the *suspended particulate matter* (SPM) *and respirable particulate matter* (RPM) in ambient air.
14. To determine the SO_2 concentration of the atmosphere.
15. To determine the NO_2 concentration in ambient air.

Evaluation scheme:

Instrument	Duration	Marks
Test- 1	1 hour	15
Test- 2	1 hour 30 minutes	25
Test-3	2 hours	35
Continuous Evaluation		25
Total marks		**100**

Books:

1. Environmental Engineering laboratory manual by B. Kotaiah and N. Kumaraswamy, Charotar publishing house, Anand, India, 1994.
2. Chemical analysis of water and soil- a laboratory manual By KVSG Muralikrishna, Environmental protection society, Kakinada, India, 1999.

Reference Books:

American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF). Standard Methods for the Examination of Water and Wastewater. 20th ed., American Public Health Association, Washington, DC, USA. 1998.

FOUNDATION ENGINEERING LAB

Course Code: **10B17CE672**
Credit: **01 (0 0 2)**

List of Experiments

1. Consolidation test
2. Triaxial compression test (Undrained condition)
3. Direct shear box test
4. Vane shear test
5. Unconfined compression test
6. Swelling pressure test
7. CBR test (Unsoaked)
8. CBR test (Soaked))
9. SPT test (Demonstration)

EVALUATION SCHEME

Total Marks	**100**
Marks Distribution	
Continuous evaluation	70
1. Attendance	
2. Record submission	
3. Regularity, sincerity and viva	
Mid- Sem Lab. Exam	15
End –Sem Lab. Exam	15

CIVIL ENGINEERING SOFTWARE LAB

Course Code: **10B17CE671**

CREDITS: **01 (0 0 2)**

PREREQUISITE(S): **Nil**

OBJECTIVE: To develop knowledge of Civil engineering software tools.

LEARNING OUTCOMES: At the end of the course students will be able to utilize the civil engg. softwares available and also able to understand and draw the drawings.

COURSE CONTENT:

1. AutoCAD: Plan, Elevation, Foundation, Column.
2. Spreadsheets: Problem based on civil related topics like structures, fluid mechanics.
3. STAADPro: Introduction, Modeling and Analysis of structures.
4. Ansys: Introduction, Analysis of 2-D structures, Plane frames.
5. MatLAB: Programming of Analysis of building.
6. Primvera: Introduction

TEACHING METHODOLOGY: The course will be covered through labs supported by assignments and team work. In team work, apart from the discussion on the topics covered in labs, teamwork in the form of problem/questions will be given.

EVALUATION SCHEME:

Instrument		**Duration**	**Marks**
Day-to-Day Evaluation	1. Assignment (15) 2. Programming (20) 3. Analysis (20) 4. Attendance (5) 5. Performance (10) } 70	Whole semester	70
Mid-Sem		1 hour	15
End-Sem		1 hour	15

Total 100

Elective -1

DESIGN OF WATER AND WASTEWATER TREATMENT PLANT

Course Code: **07B71CE401**
Credits: **03 (3 0 0)**

Prerequisites: none

Objective: To familiarize the student with the design of each unit that is included in the conventional potable water treatment and wastewater treatment plant and also the complete plant .

Learning Outcomes: Student learns to design the water and wastewater treatment plants to meet the given quantity and quality requirements based upon the standards.

Course Outline:
Water treatment : unit processes and flow sheets.
Sedimentation : Design of primary and secondary sedimentation tank, Settling and removal efficiency for discrete and flocculent settling. Coagulation : coagulants and their reactions, determination of optimum does of coagulant, design of rapid mix chamber. Flocculation, definition, hydraulic and mechanical flocculators and their design, criteria for good flocculation. Filtration : design of slow sand and rapid sand introduction to dual media filters. Disinfection : various disinfectants, chlorination and practices of chlorination. Water softening by lime soda process and ion exchange; calculation of does of chemicals. Design of a complete water treatment plant.
Wastewater Treatment: Unit Operations and flowsheets.
Preliminary and Primary treatment: screens, grit chamber and their design, sedimentation and chemical treatment of wastewater.
Secondary Treatment : Activated Sludge Process-flow sheet, aeration tanks, design of activated sludge units & modifications, trickling filters, theory and design using NRC equation. Anaerobic digestion of sludge, design of anaerobic digesters
Tertiary Treatment: Introduction to microstraining , coagulation and filtration , adsorption on activated carbon , solvent extraction , ion exchange , reverse osmosis , electrodialysis , ammonia stripping , nitrification and denitrification, biological phosphorus removal advanced biological systems , chemical oxidation. Design of complete wastewater treatment plant.

Teaching Methodology: The course will be covered through lectures and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments and actual design problems will be given.

Evaluation Scheme:

Instrument	**Duration**	**Marks**
Test 1	1 hour	20
Test 2	1:15 hour	25
Test 3	1:30 hours	30
Internal Assessment		25
Total		100

Text Books and references:

1. Wastewater Engineering - Treatment, Disposal, and Reuse - Metcalf & Eddy, McGraw-Hill Publishing Company Limited, New Delhi
2. Manual on " Water Supply and Treatment ", CPHEEO, Ministry of Urban Development , GOI, New Delhi.
3. Manual on " Sewerage and Sewage Treatment ", CPHEEO, Ministry of Urban Development , GOI, New Delhi.
4. Design of Wastewater Treatment, - S.R. Quasim, CBS Publications, U.S.A.
5. Environmental Engineering – Peavy, McGraw Hills International

WASTE MANAGEMENT

Course Code: **07B71CE402**
Credits: **03 (3 0 0)**
Prerequisite: Nil
Objective: To learn about various sources of waste, characteristics and methods of waste management.
Learning outcome: At the end of course, the students shall be able to know the management of waste generated from society.
Course Outline:

Wastewater: Sources and Characteristics of Domestic(Sewage) and Industrial WW ; Effects on Stream, Land and Air; Stream Quality Criteria and Effluent standards; Treatment Facilities and Ultimate disposal of Wastewater residues (i.e., land or water)

Sewage characteristics - Quantity & Quality, flow rate, Treatment flow-sheets. Preliminary Treatment-Design and Operation of Screening and Grit chamber. Sedimentation, Design and Operation of STP; Chemical precipitation.

Hydraulics of treatment plant, Flow measurement and Hydraulic control points, Hydraulic analysis of Unit Operations

Biological processes for wastewater treatment: Aerobic and Anaerobic Processes; Activated Sludge Process(ASP), Trickling Filter, RBC, Biofilter and UASB

Principle of biological treatment: Derivation of bacterial growth kinetics used in designing of wastewater treatment plant; Process design and operation of Activated sludge process and its modification; Bulking and rising sludge; Design of secondary settling tank.

Anaerobic treatment: Process microbiology and Biochemistry; Application for treatment of sewage; Advantage and Disadvantages.

Theory and design of wastewater disposal systems; Discharge Criteria; Disposal to inland water bodies, sea/ocean disposal, land/underground disposal

Sludge Treatment and Disposal

Concept of common effluent treatment plant (CETP)

Wastewater treatment for small communities -- Oxidation ditch, extended aeration system, SBR; Process design and operation of mechanically aerated lagoon and Waste stabilization pond system.

Sanitation - Rural sanitation; Short term and long term control of insects, rodents, vectors and nuisance; municipal sanitary standards and regulation. Sewage disposal in isolated unsewered areas-- septic tank

Introduction to industrial waste, types of wastes: solid, Liquid, and gaseous wastes; Toxic organics, Heavy metals, Hazardous waste etc

Waste generation, characterization and treatment of specific Industrial wastewater such as Sugar Mill, Dairy, Textile, Distillery, Cement and Fertilizer: Variation in wastewater flow rates and constituents, Volume and strength reduction; Neutralization, Equalization and Proportioning; Physico-chemical and biological treatment methods; Treatment Flow Diagram

Industrial solid waste disposal, Removal and control of particulate matter and gaseous pollutants, Waste management techniques. Control of Volatile organic compounds by absorption, adsorption, combustion and biofiltration.

Waste minimization as a tool for environmental protection.

Teaching methodology:

Instrument	Duration	Marks
Test- 1	1 hour	20
Test- 2	1 hour 15 minutes	25
Test-3	1 hour 30 minutes	30
Continuous evaluation		25
Total marks:		**100**

Books:

1. Arceivala, S.J.,"Wastewater Treatment for Pollution Control ", Tata McGraw Hill, 1998
2. Metcalf & Eddy "wastewater engineering-treatment and reuse", 4th edition, Tata McGraw Hill, 2003.

Reference Books:

1 Eckenfelder, W.W., (1999) "Industrial Water Pollution Control ", Mc-Graw Hill.
2 World Bank Group (1998) "Pollution Prevention and Abatement Handbook – Towards Cleaner Production ", World Bank and UNEP, Washington D.C.

ENVIRONMENTAL MANAGEMENT & IMPACT ASSESSMENT

Course Code: **07B71CE403**
Credits: **03 (3 0 0)**
Prerequisite: Nil
Objective: To learn about environment and its management, and environmental audit and impact assessment of civil engineering projects.
Learning outcome: At the end of course, the students shall be able to know the management of environment and environmental impact assessment and audit of various civil engineering projects.
Course Outline:
Environmental management **:**
Environment; Definition and elements - Interaction between abiotic and biotic elements Human interference with the environment -Resource exploitation and use of technology Impact of man, technology on environment - Exploitation and destruction Environmental degradation - current environmental concerns.
Concept of environmental management - Conservation, preservation and sustainable development
Environmental impact assessment**:**
Introduction to environmental impact assessment - Frame work of Environmental Assessment, prediction and assessment of impact on the air, water, biological & socioeconomic environment – methodologies of EIA, Future Environmental impact assessment - Some specific studies on environmental impact assessment of certain projects: Hydropower project, highway project, cement manufacturing.
Environmental audit**:**
Introduction - Types of Audits - Features of Effective auditing - programme Planning - Definition - Organisation of Auditing Programme - pre visit data collection Audit Protocol - Onsite Audit - Data Sampling - Inspections - Evaluation and presentation Audit Report.
Various environmental management systems.

Teaching methodology:

Instrument	Duration	Marks
Test- 1	1 hour	20
Test- 2	1 hour 15 minutes	25
Test-3	1 hour 30 minutes	30
Continuous evaluation		25
Total marks:		**100**

Books:

1. Man and Environment D.H. Carson 1976 Interactions Part I and III.
2. Renewable Energy Environment and Development , Maheswar Dayal Konark Publishers Pvt.Ltd.
3. Energy sources Resources and options M N Sastri Himalaya Publishing House, 1992.
4. Energy for a sustainable world, J.Goldenbery, T.B.Johanson, Amulya K.Reddy & Robert Williams, Willey Eastern Ltd., 1993
5. Cahill LB Environmental Audits, Govt. Industries
6. Center for Science and Environment (1997), The State of India's Environment 1984-85 Reprint. CSE, New Delhi.

Reference Books:

1. Canter, L.W., “Environmental Impact Assessment ", McGraw Hill, New York, 1997.
2. Petts, J., “Handbook of Environmental Impact Assessment Vol. I and II ", Blackwell Science, London, 1999.
3. The World Bank Group., " Environmental Assessment Sourcebook Vol. I, II and III ", The World Bank, Washington, 1991.
4. Paul L Bishop (2000) " Pollution Prevention : Fundamentals and Practice " , McGraw-Hill International.
5. World Bank Group (1998) " Pollution Prevention and Abatement Handbook " " Towards Cleaner Production ", World Bank and UNEP, Washington D.C.
6. Prasad modak, C.Visvanathan and Mandar parasnis (1995) " Cleaner Production Audit ", Environmental System Reviews, No.38, Asian Institute of Technology, Bangkok.
7. Young, S.S., “Environmental audit-REM 1994”, cahner publishing co.

ENERGY RESOURCES & CONSERVATION

Course Code: **07B71CE404**
Credits: **03 (3 0 0)**
Prerequisite: Nil
Objective: To learn about importance of energy resources and their conservation.

Learning outcome: At the end of course, the students shall be able to know the conservation of various energy resources.

Course Outline:

Conventional energy source: Hydropower: Fossils fuels and thermal powers, nuclear powers.
Non-Conventional energy source: solar energy, Solar Insulation, types of solar collector, solar cell, energy from wind, theory of wind power, wind system design
Energy from biomass: Design of biogas Plant.
Ocean energy, geothermal energy, Economic potential and cost

Energy conservation-principles, technologies, waste heat utilization, heat regenerators, energy storage, devices, instruction and control.

Teaching methodology:

Instrument	Duration	Marks
Test- 1	1 hour	20
Test- 2	1 hour 15 minutes	25
Test-3	1 hour 30 minutes	30
Continuous evaluation		25
Total marks:		**100**

Text books:

Rai, G. D. "Non-conventional energy sources", Khanna publishers, 4th edition, 2007
Mukund, R. P. "Wind and Solar Power Systems- Design, analysis and operation", 2nd edition, Taylor and Francis publishers, 2006
Wendell H. Wiser" Energy Resources: Occurrence, Production, Conversion, Use**",** springer-verlage, NY, 1999

Reference Book:

Energy Management handbook By C Tumewr Wayne, Wayne C Tumer-Technology-2004

Donald R. Wulfinghoff "Energy Efficiency Manual: for everyone who uses energy, pays for utilities, designs and builds, is interested in energy conservation and the environment (Energy Efficiency Manual)**"**Energy Institute Press, USA, 2000.

CONSTRUCTION SAFETY AND HEALTH

Course Code: **07B71CE405**
Credits: **03 (3 0 0)**
Prerequisite: Nil
Objective: To know about safety management of civil engineering construction projects.

Learning outcome: At the end of this course, the students shall be able to know the health and safety issues in the construction of various civil engineering projects.

Course Outline:

Concept of safety, factors affecting safety: psychological and technological, planning for safety provisions, techniques for construction safety management, safety considerations during construction, demolition and use of equipment; management of accidents/injuries, site management with regard to safety recommendations, training for safety awareness, implementation of health & safety plans, construction hazards & solutions, formulation of safety manuals, safety legislation, standards/codes with regard to construction safety, case studies, construction safety management – fundamentals, measuring performance & recording information, health hazard in construction, personal protective and lifesaving equipment, the safety policy; assessing the risks, control strategies for construction work; fire safety, the health and safety plan, training; meetings, understanding people, access to information, environment, health and safety issues - construction and the environment, construction health and safety law

Teaching methodology:

Instrument	Duration	Marks
Test- 1	1 hour	20
Test- 2	1 hour 15 minutes	25
Test-3	1 hour 30 minutes	30
Continuous evaluation		25
Total marks:		**100**

Books:

7. David L. Goetsch “Construction Safety, and Health” 2002

Reference Books:

8. Dawg, Inc “Construction Safety, and Health”.

Elective -2

HYDROPOWER ENGINEERING

Course Code: **07B71CE411**

Credits: **03 (3 0 0)**

PREREQUISITE(S): **Fluid Mechanics**

OBJECTIVE: To introduce the fundamental aspects of hydropower generation with specific focus on turbines and pumps.

LEARNING OUTCOMES: At the end of the course students will have in-depth knowledge of hydropower generation

COURSE CONTENT:

Hydraulic Turbines: Classification ,Working principles and Design of Pelton wheel, Francis and Kaplan Turbine, Velocity Triangles , head and efficiency , Draft tube , Theory and types, Similarity laws ,specific speed, Operating characteristics . Turbines, Selection of Turbines, Model Studies.
Pumps
Classification, Centrifugal pump Components and working, Velocity triangles priming, Head Losses and Efficiencies, Minimum starting speed, performance curves, specific speed, Cavitation, selection of pumps.
Positive Displacement Pump
Reciprocating pump ,types, Components and working , slip , Indicator diagram, Air vessel.
Miscellaneous Pumps (Operating Principles Only)
Multistage pumps, submersible pumps, Jet pumps, Airlift pumps, Gear Oil pump, Hydraulic ram.
Principles of hydropower development: Types+,, layouts and Component works. Surge tanks, Types and choice. Flow duration curves and dependable flow. Storage and pondage. Pumped storage plants. Special features of mini, micro,hydel plants

TEACHING METHODOLOGY: The course will be covered through lectures supported by tutorials and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

EVALUATION SCHEME:

Instrument	**Duration**	**Marks**
Test 1	1:00 hour	20
Test 2	1:15 hour	25
Test 3	1:30 hour	30
Internal Evaluation		25
Total		100

Books:

Text Books:

1. Rajput, R.K.A Text Book of Fluid Mechanics, S.Chand and Co., New Delhi, 1998.
2. Modi, P.N. and Seth, S.M., Hydraulic and Fluid Machines, Standard book house New Delhi, 1995.

Reference Books:

1. Bansal, R.K., Fluid Mechanics and Hydraulic Machines, Laxmi Publications, New Delhi, 1998.
2. Agarwal, S.K., Fluid Mechanics and Machinery, Tata McGRaw, Hill Publishing, 1987.
3.. Som,S.K., and Biswas, G., Fluid Mechanics and Fluid Machines, Tata McGraw Hill book co., 1998.

DAMS AND RESERVOIR DESIGN

Course Code: **07B71CE412**

Credits: **03 (3 0 0)**

Prerequisite(S): **Fluid Mechanics, Water Resources Engineering**

OBJECTIVE: To learn the detailed aspects of hydropower generation with specific focus on turbines and pumps.

LEARNING OUTCOMES: At the end of the course students will have in-depth knowledge of hydropower generation

COURSE CONTENT:

Planning of project, Purpose of development, Project study, Ecological and environmental considerations, Flood studies, Economic considerations.
Selection of type of dam, Classification of types, Physical factor governing selection of type, legal, economic, aesthetic considerations.
Foundation and construction materials :
Investigation, Source of information, Surface exploration, sampling, Field and laboratory tests
Earthfill dam:
Origin , Selection of type, Design principles, Foundation design, Embankments, Embankment details
Rockfill dam :
Origin and usage, Definition and types , Foundation design, Embankment design, Membrane design
Concrete gravity dam:
Introduction, Origin and development, Forces acting on dam, Requirements for stability,
Dams on pervious foundations

TEACHING METHODOLOGY: The course will be covered through lectures supported by tutorials and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

EVALUATION SCHEME:

Instrument	**Duration**	**Marks**
Test 1	1:00 hour	20
Test 2	1:15 hour	25
Test 3	1:30 hour	30
Internal Evaluation		25
Total		100

Books:

1. Design of small dams - Bureau of Reclamation USA- Oxford & IBH , New Delhi
2. Water Power Engineering - Dandeker, Vikas Publishing House - New Delhi
3. Hydropower an Indian Perspective- Naidu , CBS Pub.,New Delhi
4. Hydro-Electric and Pumped Storage Plants-M G Jog-John Wiley & Sons- New Delhi
5. Hydro-Electric Engineering Practice Vol 1- 3- J Guthrie, CBS - New Delhi
6.Hydropower Engineering by P. S. Nigam

ESTIMATION & COSTING

Course Code: **07B71CE413**

Credits: **03 (3 0 0)**

PREREQUISITE(S):

OBJECTIVE: To learn the detailed aspects of estimating and costing of civil engineering projects.

LEARNING OUTCOMES: At the end of the course students will learn various aspects estimating and costing of civil engineering projects.

COURSE CONTENT:

Different types of estimates and their uses; quantity takeoffs - providing lists of quantities of all the items of materials and equipment necessary to complete a project - based on the drawings and specifications; estimate the probable cost of construction projects including direct and indirect costs; use of computer to assist in the preparation of the estimate; Parametric Cost Estimating techniques; and labor and equipment costs considering productivity factors

TEACHING METHODOLOGY: The course will be covered through lectures supported by tutorials and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

EVALUATION SCHEME:

Instrument	**Duration**	**Marks**
Test 1	1:00 hour	20
Test 2	1:15 hour	25
Test 3	1:30 hour	30
Internal Evaluation		25
Total		100

Books:

1. Estimating and Costing in Civil Engineering: Theory and Practice Including Specifications and valuation. UBS Publishers Distributors, Delhi, 2001
2. Text Book of Estimating Costing and Valuation - Singh, Gurcharan, Singh, Jagdish, Standard publishers, Delhi, 1993

Elective-3

AIR POLLUTION MONITORING & CONTROL

Course Code: **07B71CE421**
Credits: **03 (3 0 0)**

Prerequisites: none

Objective: To develop knowledge of air pollution and various methods of its monitoring and control.
Learning Outcomes: The course provides opportunities for students to develop and demonstrate knowledge and understanding, skills and other attributes in the area of air pollution and its control .

Course Outline:
Classification and properties of air pollutants , emission sources , importance of anthropogenic sources , behaviour and fate of air pollutants , photochemical smog , effects of air pollution , air pollution laws and standards.
Meteorological aspects of air pollution dispersions , Temperature lapse Rates and Stability , wind velocity and turbulence , Plume behavior dispersion of air pollutants , the Gaussian Plume Model.
Air pollution monitering , types of pollutant ,sampling and measurement , Ambient air sampling , collection of gaseous air pollutants , collection of particulate pollutants ,stock sampling, analysis of air pollutants , sulfur dioxide , nitrogen dioxide, carbon monoxide, oxidants and ozone , hydrocarbons , particulate matter.
Control methods , sources, correction methods , cleaning of gaseous effluents , particulate emission control, gravitational settling chambers , cyclone separators , fabric filters , electrostatic precipitators , wet scrubbers , selection of particulate collector , control of gaseous emissions , adsorption by solids , absorption by liquids , combustion.
Control of sulphur dioxide emission , desulphurization of flue gases , dry methods ,wet scrubbing methods , control of nitrogen oxides , modification of operating conditions , modification of design conditions , effluent gas treatment methods , carbon monoxide control , control of hydrocarbons from mobile sources.

Teaching Methodology: The course will be covered through lectures and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation Scheme:

Instrument	**Duration**	**Marks**
Test 1	1 hour	20
Test 2	1:15 hour	25
Test 3	1:30 hours	30
Internal Assessment		25
Total		100

Books:
Text Books and references:

1. Air Pollution, H.C.V.Rao, 1990, McGraw Hill Co.
2. Environmental Pollution Control, C.S.Rao, Wiley Eastern Ltd.,1993
3. Air Pollution , M.N.Rao McGraw Hill 1993.
4. Fundamentals of Air Pollution, Samuel, J.W., 1971, Addison Wesley Publishing Co.
5. Fundamentals of Environmental Pollution, Krishnan Khannan S.Chand & Company Ltd.,1994

UNDERGROUND TECHNOLOGY

Course Code: **07B71CE422**
Credits: **03 (3 0 0)**

Course Outline:
Introduction to various underground structures
Underground construction methodology & equipments
Excavations, soil support methods, diaphragm walls
Management of groundwater, dewatering methods
Coffer dams, Caisson & wells
Methods of Basement construction
Grouting
In – situ Densification: Preloading, Compaction Grouting, Dynamic Compaction, Blast densification, Vibro–Compaction and Vibro–Replacement, Compaction piles, Reinforcement of embankments and foundations
Tunnels: Introduction, Tunnel stabilization and lining, Cut and Cover Tunnels, Bored Tunnels, Immersed Tube Tunnels, Water Conveyance Tunnels, Micro-tunnels
Underground Conduits: Ditch Conduits, Positive Projecting Conduits, Negative Projecting Conduits, Imperfect Ditch Conduits, Tunneled Conduits

Evaluation Scheme:

Instrument	**Duration**	**Marks**
Test 1	1 hour	20
Test 2	1:15 hour	25
Test 3	1:30 hours	30
Internal Assessment		25
Total		100

Books:

1. Geotechnical Engineering by Gulati & Dutta (TMH)
2. Foundation Engineering Handbook, Edited by winterkorn &Fang
3. Construction Technology by Roy Chudley & Roger Green
4. Advanced Construction Technology by Roy Chudley & Roger Green
5. Tunnel Engineering Handbook edited by Bickel, Kuesel and King (624.193 BIC)
6. Railway Bridges and Tunnels by Vazirani and Chandola (625.1 VAZ)

ADVANCED CONCRETE TECHNOLOGY

Course Code: 07B71CE423

Credits: 03 (3 0 0)

PREREQUISITE(S): None

OBJECTIVE: To develop the knowledge in new & advance concrete technology used in the construction field.

LEARNING OUTCOMES: At the end of the course students will have knowledge of different types of concrete and its use including the quality control and assessment of the concrete structure.

COURSE CONTENT:
Plain Concrete, Reinforced concrete, Pre-stressed Concrete, Cellular Concrete,. Light weight concrete, Smart Concrete, Fibre Reinforced Concrete, Ferrocement, Polymer Concrete Composites, Special concretes, Self-Compacting Concrete, Admixtures, Fly Ash Concrete, High Performance Concrete, Admixtures, Properties of hardened concrete. Standards, Specifications and Codes of Practice, Quality control, Repairing concrete, special processes and technology for particular types of structure, Ready-mixed concrete, Assessment of concrete construction.

TEACHING METHODOLOGY: The course will be covered through lectures supported by tutorials. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Text Books

1. Neville,A.M. Properties of Concrete. ELBS Edition (4^{th} ed.) Longman Ltd.,London
2. P. K. Mehta, P J M Monteiro, Concrete, Prentice Hall, New Jersey (Special student edition by Indian concrete institute Chennai
3. Concrete technology by S N Sihna
4. Concrete technology by M L Gambhir

References

1. Neville&Brooks Concrete Technology, ELBS Edition, Longman Ltd.,London
2. Taylor, Concrete Technology

ANALYSIS OF STRUCTURES BY MATRIX APPROACH

Course Code: **07B71CE424**

Credits: **03 (3 0 0)**

PREREQUISITE(S): None

OBJECTIVE: To develop the knowledge of computer application and matrix approach to analysis the structure.

LEARNING OUTCOMES: At the end of the course students will have understand the matrix approach to analysis the structure.

Course content:
Classical and matrix methods of structural analysis; influence coefficients, transformation matrices. Matrix formulation of the force and of the displacement methods of analysis. Direct stiffness approach; substructure technique.Computer applications.

TEACHING METHODOLOGY: The course will be covered through lectures supported by tutorials. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Books.

1. Structural Analysis: A United Classical and Matrix Approach / Ghali, A.
2. Structural Analysis: A Matrix Approach / Pandit, G.S.
3. Matrix Analysis of Framed Structures / Weaver, William (Jr.)
4. Structural Analysis: A Classical & Matrix Approach by MCCORMAC Jack C., NELSON James K.

MECHANICAL & ELECTRICAL SYSTEMS IN BUILDINGS

Course Code: **07B71CE425**
Credits: **03 (3 0 0)**

Prerequisite: work shop technology, basic electrical engineering & environmental engineering

Objective: To learn the fundamentals of mechanical and electrical systems in buildings,
Learning outcome: At the end of course, the students shall be able to know the fundamentals of mechanical and electrical systems in buildings.

Course content:
Site utilities (water, sewer, gas, and storm); residential and commercial plumbing systems; and specialty topics of fire protection, storm water, and natural gas;
HVAC fundamentals, pumps, ventilation & cooling, air conditioners, and heating systems;
Introduction to electricity, power systems and equipments, general requirements & planning of electrical and communication installations, inspection and testing of installations,
lightning protection of buildings, boxes and conduit, service and distribution, transformers, grounding, branch circuits and feeders, motors and motor controls, lighting, fire alarm system, and low voltage systems

Teaching Methodology:

Instrument	Duration	Marks
Test 1	1 hour	20
Test 2	1 hour15 minutes	25
Test 3	1 hour 30 minutes	30
Continuous evaluation		25
Total marks:		**100**

Books:

1. Basic electrical Engineering By B.L. Thereja
2. Mechanical & Electrical equipments for buildings , by Steim Benjmen Reynolds, publishers: john William & sons

Electives from PD menu for VIIth and VIIIth Semester

ENTREPRENEURIAL DEVELOPMENT

Course Code : 07B71PD601
Credit : 03 (3-0-0)

Objectives: To make the students aware of various processes of new venture creation and the critical knowledge needed to manage business once it is formed.

Content:

Introduction Foundations of Entrepreneurship Inside the Entrepreneurial Mind
Building the Business Plan: **Beginning Considerations** Strategic Management and the Entrepreneur. Forms of Business Ownership and Franchising. Buying an existing Business.
Building the Business Plan: **Marketing Considerations** Building a powerful Marketing Plan E-Commerce and the Entrepreneur Integrated Marketing Communications and Pricing Strategies
Building the Business Plan: **Financial Considerations** Managing Cash Flow Creating a successful Financial Plan
Building a Competitive Edge Leading the growing Company and Planning for Management Succession Global Aspects of Entrepreneurship
Intermittent Guest Lectures E-Commerce, Patenting, Funding agencies, Franchising, opportunities for entrepreneurs, making Proposals & Business Plans, Formation of company

Methodology

The lectures will be supported with laboratory work, which includes case studies, business plan discussions and group presentations. Notification of the laboratory assignments will be made during the lecture.

Books for Reference

Entrepreneurship Development	Zimmrer
Entrepreneurship Development	Anil Kumar

Evaluation System

Test 1	**20**
Test 2	**25**
Test 3	**30**
Presentation	**20**
Attendance	**05**

MANAGING AND MARKETING TECHNOLOGY

Course Code : 07B71PD602
Credit : 03 (3-0-0)

Objective:
The course emphasizes on key concepts and issues underlying the modern practice of marketing. The role of marketing in the organization and in society is examined and analyzed. Course content includes the general nature of marketing in both macro and micro contexts, the marketing concept, buyer behavior, and marketing organization. The marketing process is analyzed through the four main decision areas of products and services, distribution, promotion, and pricing.

Course Content:

UNDERSTANDING MARKETING MANAGEMENT:

- Defining Marketing For 21st Century
- The importance of marketing
- The scope of marketing

DEVELOPING MARKETING STRATEGIES AND CAPTURING MARKETING INSIGHTS:

- Marketing and Customer Value
- Corporate and Division Strategic Planning
- Gathering Information and Scanning the environment
- Analyzing the Macro environment

DEVELOPING THE MARKETING MIX

- Product, Services and Branding Strategies
- New Product Development and Product Life-Cycle Strategies
- Pricing Strategies, Considerations and Approaches
- Marketing Channels and Supply Chain Management
- Advertising, Sales Promotion, personal Selling and Direct Marketing.

CONNECTING WITH CUSTOMERS AND ANALYSING CONSUMER MARKETS

- Creating Customer Value, Satisfaction and Loyalty
- Cultivating Customer Relationship
- What Influences Consumer Behavior?
- The Buying Decision Process

MANAGING MARKETING AND GROWTH

- Creating Competitive Advantage
- The Global Marketplace
- Social Responsibility and Marketing Ethics

Managing a Holistic Marketing Organization

References

1. Kotler, Philip and Gary Armstrong, Principles of Marketing, 10th Edition, New Delhi, Pearson Education, 2004. (Text)
2. Darymple, Douglas J., and Leonard J. Parsons, Marketing Management: Text and Cases, 7th Edition, John Wiley & Sons (Asia) Pte. Ltd., 2002.

3. Kotler, Philip and Kevin Lane Keller, Marketing Management, 12th Edition, New Delhi, Pearson Education, 2006.

4. Winer, Russell S., Marketing Management, 2nd Edition, Prentice Hall, 2003.

5. Dalrymple, Douglas J., and Leonard J. Parsons, 2nd Edition, Wiley Publication, 2000.

Evaluation Scheme

Test I	20 marks
Test II	25 marks
Test III	30 marks
Attendance	5 marks
Project Work	20 marks

TOTAL QUALITY MANAGEMENT

Course Code : 07B81PD603
Credits : 03 **(3-0-0)**

COURSE OBJECTIVES

For the student to be equipped with the skills and knowledge necessary to implement a successful TQM program in their company, an understanding of the history, purpose and fundamentals of TQM, the tools and techniques that can improve operations, product quality, process quality, customer satisfaction and employee involvement, and the various methods to assess progress of the TQM journey.

Course Content:

Introduction **Basics of Total Quality, Total Quality Management, TQM: Thinkers and Thoughts,** Quality Awards
Features of TQM Cost of Quality, Team work for Quality, Total Employee Involvement, Customer Satisfaction
Continuous Improvement: Quality Circles, Kaizen, Six Sigma, People CMM, Benchmarking
Basic Statistical Concepts: Control of Accuracy and Precision, Process Capability Statistical Process Control, Quality Management Systems, Design of Experiments (Taguchi Technique), FMEA, Total Productivity Maintenance
Quality Standards & Certifications : ISO: 9000 series ISO: 14000 series

Recommended Books

1. Besterfield Dale H., Carol Bestfield-Michna, Glen Besterfield, Sacre Mary Besterfield, Total Quality Management, Third Edition, Pearson Education 2005.
2. Montgomery Douglas C., Introduction to Statistical Quality Control, Fourth Edition, John Wiley & Sons Inc.2003
3. Wadsworth, Modern Methods Quality and Improvement, 2nd edition, CBS Publications, 2004

Evaluation Scheme:

Test 1	20
Test 2	25
Test 3	30
Internal Assessment	25 (Attendance- 5, Presentation - 20)

KNOWLEDGE MANAGEMENT

Course Code : 07B81PD604
Credits : 03 (3-0-0)

Course Content:

Introduction, Types of Knowledge;
Knowledge workers,
Valuing knowledge,
Communities of Practice,
Content management,
Creativity and Innovation
Knowledge management strategies,
Business process and the process-oriented organization,
Information and communication technologies (ICT),
Management of intellectual capital,
Different level of Knowledge management,
Organizational culture,
Developing human capital,
Building and managing the knowledge repository

Recommended Books:

Awad and Ghaziri, Knowledge management, Pearson education
Maier, R Knowledge management systems. Information and communication technology for Knowledge Management

Evaluation Scheme:

Test 1	20
Test 2	25
Test 3	30
Internal Assessment	25 (Attendance- 5, Presentation - 20)

Elective-4

ADVANCED RCC DESIGN

Course Code: 10B13CE831
Credits: 03 (3 0 0)
Prerequisite: Design of Concrete Structures
Course objectives
The objective is to have students understand the behavior and the criteria for design ofadvance RCC structure.
Learning Outcome
After completing the course students will able to understand:

define service criteria and factored strength criteria for acceptance of basic reinforced concrete members, design steps of bunker, silo retaning wall etc.

Course Content:
Design of Bunker & Silo,
Design of **Retaining walls**
Design of water tank, culverts, Flat Slabs, Building Frames, **Chimneys**.

Methodology: The course will be covered through lectures supported by tutorials. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Books:
Advanced Reinforced Concrete Design by P.C. Varghese
Advance R. C. C. Design by Bhavikatti

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

GROUND IMPROVEMENT TECHNIQUES

Course Code: **10B13CE832**
Credits: 03 (3 0 0)
Course Outline:
Requirement of ground improvement, various techniques of ground improvement, mechanical compaction, dynamic compaction, preloading with sand drains, dynamic consolidation, compaction by blasting, use of granular columns, admixtures, grouting, reinforced earth, soil replacement techniques.

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

Books:
Text Book:
1. Geotechnical Engineering by Shashi K. Gulhati & Manoj Datta (TMH)
2. Foundation analysis & design by Joseph E. Bowles

INDOOR AIR QUALITY AND NOISE CONTROL

Course Code: 10B13CE833
Credits: 03 (3 0 0)
Prerequisite: Nil
Objective: To learn about Overview of indoor air quality and noise pollution

Learning outcome: At the end of course, the students shall be able to know the control of indoor air quality and noise pollution.
Course Outline:
Overview of indoor air quality:
Concepts of indoor air quality, respiratory needs, odours, health requirements, toxicity of pollutants, productivity as related to indoor air quality, sick building syndrome, building related illness, legionnaires' disease, time budget of people, relationship between indoor air quality and energy efficiency, microclimate, indoor air quality indicators, ventilation standards.
Sources and characterization of pollutants:
Sources, sinks, characterization and health effects of pollutants. Building materials, ambient air pollutants including carbon dioxide, carbon monoxide, nitrogen dioxide, sulfur dioxide, ozone, environmental tabacco smoke, bioaerosols including bacteria, viruses, fungi, mites, etc, physical pollutants such as radon and asbestos, dusts and respirable suspended particulates, volatile organic compounds, formaldehyde.
Concentration and exposure of pollutants:
Measurement and modeling, source and sink modeling, concepts of concentration, macroscopic modeling in both single-zone and multi-zone buildings, particle deposition and resuspension, particle penetration, exposure, does-response relationships, individual exposure, population exposure, continuing reading methods, integrated sampling methods, measurement and sampling of main IAQ parameters, monitoring for indoor air quality control
Indoor air quality control and assessment:
Source control, ventilation systems for indoor air quality, filtration, indoor air cleaning systems, control of infiltration, demand-control ventilation, relationship between indoor and ambient air quality, indoor air quality assessment and investigation, control strategies for pollutants originating from indoors, outdoors and both indoors and outdoors.
Legislation and public policy issues
Indoor air quality standards, threshold theory, smoking regulations, codes and regulations, energy and cost implications of indoor pollution control, air pollution control ordinance and regulations, liabilities and litigation, guidance notes, IAQ certification schemes.
Noise pollution and control:
Measurement of noise, outdoor and indoor noise propagation, noise control criteria.
Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

Text Books:

1. H.E. Burroughs and Shirley J. Hansen "Managing Indoor Air Quality", 3rd Edition**,** Fairmont Press, 2004.
2. ICMR Bulleten "Indoor air pollution in india – a major Environmental and public health concern", 31(5), Printed and Published Indian Council of Medical Research, New Delhi, 2001.
3. Sincero,A.P. and Sincero, A.G. "Environmental Engineering- A design approach" Prentice-Hall of India, 1996.

Reference Books:

1. John D. Spengler, John F. McCarthy, and Jonathan M. Samet **"**Indoor Air Quality Handbook", McGraw-Hill Professional, 2000.
2. Yuanhui Zhang "Indoor Air Quality Engineering", 1 st edition, CRC, 2004.

ADVANCED HYDROPOWER ENGINEERING

Course Code: **10B13CE834**

Credits: **03 (3 0 0)**

Prerequisite(s): **Fluid Mechanics, Hydropower Engineering**

OBJECTIVE: To learn the detailed aspects of hydropower generation with specific focus on turbines and pumps.

LEARNING OUTCOMES: At the end of the course students will have in-depth knowledge of hydropower generation

COURSE CONTENT:

Planning of hydropower development, site investigations, Hydrological investigations, assessment of Hydropower potential, water availability, installed capacity determination.
Design of civil works: Diversion structures, water conductor systems, desilting tanks, cross drainage structures, forebay, Surge tanks and hydraulic transients, Penstocks and pressure shafts, Intakes, penstock, powerhouse, and tailrace.
Operation of power plants for peaking and base load, Characteristics of power market, Integration of various types of plants, Augmentation of power plants, Pump storage plants
Reservoir operation for hydropower generation in multipurpose projects.
Basin scale hydropower generation in a multipurpose project, Basin scale hydropower development.

TEACHING METHODOLOGY: The course will be covered through lectures supported by tutorials and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

Books:

1. Design of small dams - Bureau of Reclamation USA- Oxford & IBH , New Delhi
2. Water Power Engineering - Dandeker, Vikas Publishing House - New Delhi
3. Hydropower an Indian Perspective- Naidu , CBS Pub.,New Delhi
4. Hydro-Electric and Pumped Storage Plants-M G Jog-John Wiley & Sons- New Delhi
5. Hydro-Electric Engineering Practice Vol 1- 3- J Guthrie, CBS - New Delhi
6.Hydropower Engineering by P. S. Nigam

TRAFFIC ENGINEERING

Course Code: **10B13CE835**
Credits: **03 (3 0 0)**

Prerequisite: Highway Engineering
Objective: To learn the fundamentals of traffic engineering and to implement them for developing a computer based system for fast and efficient design.
Learning outcome: At the end of course, the students shall be able to solve problems related to traffic in the existing or new highway areas.
Course Outline:
Administration and functions , road user and vehicle characteristics,
Speed, journey time and delay surveys, vehicle volume counts, classification and occupancy,
O&D surveys, parking surveys, photographic techniques in traffic survey, statistical methods for traffic engineering,
speed studies, traffic forecasting ,geometric design ,traffic signs ,road markings, traffic signals, street furniture, regulation of traffic, road accidents ,street lighting ,traffic management ,highway capacity, basic diagram of traffic flow,

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

Books:
1. Highway Engineering by 'A.K.Justo & S.K.Khanna' Nemchand Publ. Roorkee.
2. Transportation Engineering, an Introduction by 'C.Jotin Khisty & B.Kent Lall; PHI,
3. IRC codes and Manuals
4. Traffic engineering & transportation planning, L.R.Kadiyali, Khanna Publishers, Delhi (1997)
5. Traffic and Transportation engineering by 'Animesh Das and P. Chakraborty', PHI 6.Principles of Urban Transportation System Engineering, B.G.Hutchinson', TMG, Publication
7. Principles and practices of Highway engg, L.R.Kadyali & N.B.Lal, , Khanna Publishers, Delhi (2006)

CONSTRUCTION TECHNIQUES

Course Code: 10B13CE836

Credits: 03 (3 0 0)

PREREQUISITE(S): None

OBJECTIVE: To develop the knowledge of different construction techniques used in the construction process including the innovative techniques.

LEARNING OUTCOMES: At the end of the course students will have knowledge of different construction technology and new techniques used in global construction practices..

Course Contents:
Construction techniques: steel concrete and Timber; roof systems; masonry construction; building insulation;. Concrete formwork design, construction techniques for high rise buildings, dam, Tunnels etc, repair techniques, innovative construction techniques, prefabrication and pre-casting, modular construction.

TEACHING METHODOLOGY: The course will be covered through lectures supported by tutorials. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given

Books:

1. Construction Technology by Chudley, Roy
2. Advanced Construction Technology / Chudley, Roy
3. Construction Technology for Tall Buildings by Lin, Michael Chew Yit
4. Construction Technology: Analysis and Choice by Tony Bryan
5. Construction Technology by Eric Fleming

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

Elective-5

FINITE ELEMENT METHODS AND ITS APPLICATIONS TO CIVIL ENGINEERING

Course Code: **10B13CE837**

Credits: **03 (3-0-0)**

PREREQUISITE(S): Mechanics of Solids and Structural Analysis.

OBJECTIVE: To develop the knowledge of FEM and its applications.

LEARNING OUTCOMES: At the end of the course students will have knowledge of Finite Element Method and application of FEM in Civil Engineering Problems.

COURSE CONTENT:

Introduction
Matrix-Displacement Formulation
Element Shapes, Nodes, Nodal Unknowns and Co-ordinate Systems
Shape Functions
Strain-Displacement Matrix
Assembly Stiffness Equation – Direct Approach, Galerkin's Method, Virtual Work Method, Variational Method
Applications of FEM in Civil Engineering
1-D Static Problems: Rod, String, Beam, Shaft
One-dimensional Formulations; Boundary Conditions; Solution Algorithms; Descretization; Stress Deformation Analysis
2-D Static Problems: Plane Stress, Plane Strain, Axisymmetric Problems, Stability of Columns and Thin Plates
Two-dimensional Formulations; Boundary Conditions; Solution Algorithms; Descretization; Stress Deformation Analysis
Introduction to Commercial Packages and Recent Developments

TEACHING METHODOLOGY: The course will be covered through lectures supported by tutorials. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

BOOKS & REFERENCES:

1. C. S. Krishnamoorthy, Finite Element Analysis – Theory and Programming, Tata McGraw-Hill, 2nd Ed., 1994
2. S. S. Bhavikati, Finite Element Analysis, New Age International (P) Limited Publishers, 1st Ed., 2005
3. O. C. Zienkiewicz, The finite element Method, McGraw-Hill, 3rd Ed., 2003
4. J. N. Reddy, An Introduction to the Finite Element Method, McGraw-Hill, 2nd Ed., 1996

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

SOIL DYNAMICS AND MACHINE FOUNDATIONS

Course Code: **10B13CE838**
Credits: 03 (3 0 0)
Course Outline:

Nature of dynamic loads; Theory of free and forced vibrations; Wave propagation; Vibration isolation,
Strength and deformation characteristics of soils under dynamic loads,
Shallow footing- Bearing capacity under dynamic loads design,
Pile foundation- Behavior of piles under dynamic loads,
Dynamic earth pressure- retaining walls under dynamic loading, analytical and graphical methods, Seismic slope stability
Design of Reciprocating & Impact machine foundation.

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

Books:
Text Book:

1. Soil Dynamics by S. Prakash, TMH Publication
2. Fundamentals of Soil Dynamics by B.M. Das, Elsevier Publication
3. Foundation for Machine: Analysis and Design by S. Prakash and V. K. Puri, Jhon Wily & Sons
4. Soil Dynamics and Machine Foundation by Swami Saran
5. Vibration Analysis and Foundation Dynamics by Kameshwar Rao, Wheeler Publication
6. Geotechnical Earthquake Engineering by S L Kramer,

SUSTAINABLE DESIGN AND CONSTRUCTION

Course Code: 10B13CE839

Credits: 03 (3 0 0)

Prerequisite(s): None

Objective: To develop the knowledge of sustainable construction and design.

Learning Outcomes: At the end of the course students will have knowledge of sustainability in construction and various methods adopted for sustainable construction and design.

COURSE CONTENT:
Introduction to sustainable design and construction
Background: Ethics and Sustainability, Basic concepts, Major Environmental and Resource concerns, Green Building movement.
Green Building Assessment: LEED Building Assessment Standard.
Ecological Design.
Green Building Process : Conventional versus Green Building Delivery Systems, Integrated Design Process.
Sustainable sites and Landscaping.
Energy and Atmosphere: Building Energy issues, Passive Design Strategy, Building Envelope, Internal load reduction, Innovative Energy optimization strategies.
Building Hydrologic System: Low Flow and Ultra Low flow fixtures, Rainwater Harvesting, Graywater systems, Reclaimed water.
Green Building Materials and Green Building Products
Indoor Environmental Quality: Indoor Environment Factors, HVAC systems, Best Practices for IAQ.

TEACHING METHODOLOGY: The course will be covered through lectures supported by tutorials. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

BOOKS & REFERENCES:

1. Sustainable Construction : Green Building Design and Delivery by Charles J. Kibert.
2. Green Building Handbook: A Guide to Building Products and Their Impact on the Environment by Tom Woolley, Sam Kimmins
3. Passive Solar House: Using Solar Design To Heat And Cool Your Home by James Kachadorian
4. Energy-Efficient Building Systems by Lal Jayamaha
5. Sustainable Construction by Ch. Hendriks
6. The Philosophy of Sustainable Design by Jason F. McLennan

OPERATION AND MAINTENANCE OF HYDRO POWER PROJECT

Course Code: **10B13CE841**

Credits: **03 (3 0 0)**

PREREQUISITE(S): **Fluid Mechanics, Hydropower**

OBJECTIVE: To learn the detailed aspects of hydropower projects with specific focus on reservoirs operation and maintenance and Maintenance of Civil Engg Works

LEARNING OUTCOMES: At the end of the course students will learn various aspects of operation and maintenance of civil engineering projects.

COURSE CONTENT:

Reservoirs operation and maintenance, Aspects of operation and maintenance, Maintenance of Civil Engg Works, Maintenance of electrical and mechanical plant, Inspections and schedule of observations, Maintenance and operating instructions, Operation : Storage dams, Diversion dams, Flood detention reservoirs, Changes in operating plan, Coordination of multiple uses, Maintenance of dams :
Earthfill dams, Rockfill dams, Concrete dams and concrete structures, Mechanical equipment, Reporting of abnormal development, Economic considerations

TEACHING METHODOLOGY: The course will be covered through lectures supported by tutorials and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

Books:

1. Design of small dams - Bureau of Reclamation USA- Oxford & IBH , New Delhi
2. Water Power Engineering - Dandeker, Vikas Publishing House - New Delhi
3. Hydropower an Indian Perspective- Naidu , CBS Pub.,New Delhi
4. Hydro-Electric and Pumped Storage Plants-M G Jog-John Wiley & Sons- New Delhi
5. Hydro-Electric Engineering Practice Vol 1- 3- J Guthrie, CBS - New Delhi

HIGHWAY CONSTRUCTION, MAINTENANCE AND MANAGEMENT

Course Code: **10B13CE842**
Credits: **03 (3 0 0)**

Prerequisite: High way engineering

Objective: To learn the fundamentals of highway construction and its maintenance and to implement them for developing a computer based system for fast and efficient managements.
Learning outcome: At the end of course, the students shall be able to know the highway construction procedure along with maintenance & management of any existing or new highway .

Course content:
Highway construction:
Introduction, history of road construction, equipments for the road construction, stages of construction, limitations in pavement construction due to weather.
Earthwork:
Clearing and grubbing, excavation, embankment construction, replacement of soils, soil stabilization.
Bituminous pavement construction:
Sub grade, granular sub base, sub base course, binder course, wearing coat, interlayer coats.
Cement concrete pavement:
Sub grade, base and sub base courses, concrete surfacing, joints for cement concrete pavement,
Highway maintenance:
General, distress in pavements (Cracking, patching, rutting, pot holes, stripping and swelling), evaluation of pavement, structural evaluation, pavement maintenance.
Introduction to transport economics.
Recycling of pavements:
Introduction, selection of road for recycling, methods and equipments for recycling.
Hill Roads: Alignment, geometrics, design and construction for hill roads, drainage design, maintenance problems in hill roads.

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

Text books:
1. Principles of transportation Engineering By Partha Chakraborty and A. Das
2. Highway Engineering By S.K.Khanna and C E G Justo

CONSTRUCTION CONTRACTS & LAWS

Course Code: **10B13CE844**
Credits: **03 (3 0 0)**

Course Outline: Basics of the legal system including contracts, torts, land zoning and property ownership, bonds and insurance, bidding, subcontracting, contractor liability, mechanics liens, litigation and arbitration, Indian and international construction law, hazardous waste issues and labor laws, disputes and disputes resolutions, case studies, Indian contract act, elements, types, features-suitability-design of contract documents, international contract document, law of torts; tenders: prequalification-bidding-accepting-evaluation of tender, formation and interpretation, potential contractual problems, world bank procedures and guidelines; BOT projects, arbitration, comparison of actions and laws, agreements, conditions of arbitrations, powers and duties of arbitrator, rules of evidence, Dispute Redressal Boards(DRB), Laws: legal requirements, insurance and bonding, laws governing sale, purchase and use of urban and rural land, land revenue codes, tax laws, income tax, sales tax, excise and customs duties, legal requirements for planning, property law, agency law, local government laws for approval, statutory regulations

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

Books:
Text Book:

1. Construction Management and Planning by B. Sengupta & H. Guha
2. Construction Planning and Management by P.S. Gahlot & B.M. Dhir
3. Construction Planning and Management by U. K. Srivastava
4. Construction Contracts by Edward Whitticks

Elective-6

EARTHQUAKE ENGINEERING

Course Code: **10B13CE845**
Credits: **03 (3 0 0)**

Prerequisite: None

Course objectives

Introduce the basic concepts in dynamic as well as probabilistic modeling of earthquake loading and dynamic analyses/simulation with uncertainty in earthquake engineering. Introduce the basics of structural dynamic analyses with emphasis on earthquake engineering applications. Introduce the basics of probabilistic assessment of seismic hazard and structural reliability.

Learning outcomes: By the end of the course students will have been introduced to a broad range of material in earthquake engineering.

- Determine the natural frequency of a single degree of freedom dynamic system for given mass, structural properties, and damping.
- Determine the maximum dynamic response of an elastic vibrating structure to a giving forcing function.
- an understanding of earthquakes as they interpreted in the context of engineering
- an understanding of response spectra and how they form the basis of the design process
- an understanding primarily from a structural engineers perspective of the soil structure interaction
- an inspiration to consider employing seismic isolation in the next possible design project

Course Content

NATURE OF EARTHQUAKES: Plate Tectonics Theory, Faults and fault movements, Magnitude of earthquakes, Intensity scaling of earthquakes: subjective intensity and instrumental intensity, Characteristics of earthquake ground motions

RESPONSE OF SIMPLE STRUCTURES TO EARTHQUAKE GROUND MOTIONS: Seismic response of linear elastic single degree of freedom (SDOF) systems, Seismic response of inelastic SDOF systems Response spectra

RESPONSE OF MULTI DEGREE OF FREEDOM SYSTEMS (MDOF) TO
EARTHQUAKE GROUND MOTIONS: Free vibration analysis, Equivalent Lateral Load Procedure, Mode Superposition Procedure

SEISMIC DESIGN PRINCIPLES: Earthquake design philosophy, Design spectrum, Earthquake resistance of building systems, Response modification factors

SEISMIC CODE PROCEDURES: Classification of building systems, Selection of analysis procedure, Capacity design principles for reinforced concrete buildings, Case study: analysis and design of a multistory R/C frame

Methodology: The course will be covered through lectures supported by tutorials. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

Text/reference materials

1. Earthquakes: B. Bolt. Freeman, 1993.
2. Dynamics of Structures: A. Chopra. Prentice-Hall, 1995.
3. Seismic Design of Reinforced Concrete and Masonry Buildings: T. Paulay and M.J.N. Priestley, J. Wiley, 1992.
4. Deprem Bölgelerinde Yapılacak Yapılar Hakkında Yönetmelik, 2007.
5.I.S. Codes No. 1893, 4326, 13920 etc.
6. Clough R.W. and Penzien J., 'Dynamics of Structures', McGraw-Hill, 2nd edition, 1992
7. Newmark N.M. and Rosenblueth E., 'Fundamentals of Earthquake Engg.', Prentice Hall, 1971.

PRESTRESSED CONCRETE STRUCTURES

Course Code: 10B13CE846
Credits: 03 (3-0-0)
Prerequisites: none

Course Objectives: Develop professional level competence in the design of commonly used prestressed Concrete structures.
Learning Outcomes: Students have the ability to carryout design of commonly used prestressed concrete systems using fundamental principles as well as design aids.

Course Outline:
Introduction to basic concept of prestressing, System of prestressing , Loss of prestress, Analysis for flexure, Design for flexure shear and torsion, Deflection and cracking consideration, Precast elements: poles, railway sleepers, beams, slab, wall panel and columns, use of relevant codes of practice.

Teaching Methodology: The course will be covered through lectures supported by tutorials and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

Books :

Text Books:
1. Prestressed concrete, Krishna Raju, TMH
Reference Book:
2. Prestressed concrete, Pandit & Gupta, CBS
3. T.Y. Lin, Design of Prestressed Concrete Structures, Asia Publishing House, 1955.
4. Y. Guyan, Limit State Design of Prestressed Concrete, Applied Science Publishers, 1972.

DESIGN OF WATER SUPPLY & SEWAGE DISPOSAL SYSTEMS

Course Code: **10B13CE847**
Credits: **03 (3 0 0)**
Prerequisites: none

Objective: To familiarize the student with the systems of water supply and disposal of sewage and with the design of components included therein.

Learning Outcomes: Student learns to design the water supply system and sewage disposal system for the given conditions .

Course Outline:
Water Supply -Design period , population forecasting , water demand , sources of water , source selection , water quality , characterisation , water quality standards ,design of intake structures , hydraulics of flow in pipes , transmission main design , laying, jointing & testing of pipes, appurtenances , determination of reservoir capacity, transportation and distribution of water, distribution system design and analysis; hydraulic analysis of water distribution systems including line sizing, fire protection, valves, and storage; optimization of pipe network systems, distribution reservoirs and service storage, pumping and design considerations for pumps.
Sewage disposal system - sources of wastewater , quantity of sanitary sewage , estimation of storm runoff , characteristics and composition of sewage , effluent standards , hydraulics of flow in sewers , design of sanitary and storm sewers , laying, jointing & testing of sewers , appurtenances , pumps, disposal of treated waste, disposal in land environment, disposal in water environment.

Teaching Methodology: The course will be covered through lectures and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments and actual design problems will be given.

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

Books:
Text Books and references

1. Design of Wastewater Treatment, - S.R. Quasim, CBS Publications, U.S.A.
2. Environmental Engineering - Peavy McGraw Hills International.
3. Wastewater Engineering - Metcalf & Eddy Tata-McGraw Hill.
4. Water and Wastewater Engineering Vol. II - Fair, Geyer and Okun, John Wiley & Sons.
5. Water Supply and Sewerage - B.S.N. Raju, Tata McGraw Hills.

RIVER ENGINEERING

Course Code: **10B13CE848**

Credits: **03 (3 0 0)**

Prerequisite(s): **Fluid Mechanics**

Objective: To introduce the fundamental aspects of river engineering with specific focus on alluvial channel hydraulics that governs the river systems in the Indian sub-continent.

Learning Outcomes: At the end of the course students will have in-depth knowledge of river morphological processes.

Course Content:
Elements of river geomorphology: Origin and properties of sediment, river problems control of vegetation an river morphology.
Soil Erosion and Sediment Yield: Types of erosion, Mechanism of soil erosion, Sediment delivery ratio, Process based modeling of soil erosion.
Hydraulics of Alluvial Streams: Incipient motion, Modes of Sediment transport, Bed-forms, Resistance to flow in alluvial rivers, Bed load transport, Suspended load transport
River Geometry and Plan Forms: Stable channels and their geometry, Flow around river bends, Braided river, Meandering river.
Gravel Bed Rivers : Hydraulic geometry of gravel bed rivers, Armouring, Bed forms and resistance to flow in gravel bed rivers.
Bed Level Variations in Streams : Degradation, Local scour, Aggradation, Reservoir sedimentation, Mathematical modeling for river bed variations.
Rivers and Environment: Environmental effects of hydraulic structures, River pollution, River action plans, Stream restoration.

TEACHING METHODOLOGY: The course will be covered through lectures supported by tutorials and term work. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

Text Books

1. "River Morphology", Garde R.J. New Age International Publishers, N. Delhi. (2006)
2. "Erosion and sedimentation", Julin, P.Y., Cambridge University Press. (1998)
3. "Principles of river Engineering", Jansen P.P.H. VSSD Publications Neatherlands. (1994)

ADVANCED PAVEMENT DESIGN

Course Code: 10B14CE831
Credits: 03 (3-0-0)
Pre requisite: Highway engineering,
Objective: To learn the fundamentals for designing of highway and to implement them for developing a computer based system for fast and efficient design.
Learning outcome: At the end of course, the students shall be able to design the highways by using latest techniques.

Course Outline:
Advanced highway materials; Sub grade soils , Special problems in soil stabilization works, stone aggregates, Bituminous materials, Bituminous paving Mixes, Modified binders, Cement concrete Mixes,

Design of bituminous mixes by marshal method, modified Hubbard –field method, Hveem method etc

Flexible pavements: Layered system concept, California Resistance value or stabilometer method triaxial test method, McLeod method, Burmister method,

Rigid pavements: design parameters, modulus of sub grade reaction, stresses calculation, design of slab, spacing of joints, dowel bars, tie bars, reinforcement etc

Overlays: Pavement strengthening problems, types of overlays, advantages of Cement concrete overlays over bituminous overlays, white topping, overlay design,

Joint filling &sealing, pre stressed concrete pavements, Influence charts,

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

Books:
Principles of pavement design: by Yoder E.J. Published by john wiley and sons, USA
1. Highway design and construction RJ Salter - 1988 - Basingstoke: Macmillan
2. Highway Design and Construction Bruce, Arthur, International Textbook Co,
3. Flexibility in Highway Design Garvey, Jane F., Acting Federal Highway Administrator
4. Highway Traffic Analysis and Design N.B. Hounsell, Allbooks.tv (West Sussex, United Kingdom)

CONSTRUCTION PLANNING AND CONTROL

Course Code: **10B14CE832**

Credits: **03 (3 0 0)**

PREREQUISITE(S): none

OBJECTIVE: To develop the knowledge of construction management and its applications. In projects.

LEARNING OUTCOMES: At the end of the course students will have knowledge of planning scheduling & control of civil engineering construction projects.

Course contents:

Construction Planning: Basic concepts in the development of construction plans-choice of Technology and Construction method. Scheduling: process & techniques: Defining Work Tasks-Definition-Defining Precedence relationships among activities-Estimating Activity Durations-Estimating Resource Requirements for work activities-coding systems. Cost control: Relevance of construction schedules-The critical path method-Calculations for critical path scheduling-Activity float and schedules-Presenting project schedules-Critical path scheduling for Activity-on-node and with leads with resource constraints.: Cost Control: The cost control problem-The project Budget-Forecasting for Activity cost control Financial accounting systems and cost accounts-Control of project cash flows. Quality control, Types of project information-Accuracy and Use of Information-Computerized organization and use of information.

TEACHING METHODOLOGY: The course will be covered through lectures supported by tutorials. In tutorials, apart from the discussion on the topics covered in lectures, assignments in the form of questions will be given.

Evaluation Scheme:

Instrument	**Duration**	**Marks**
test 1	1 hour	15
test 2	1:30 hour	25
test 3	2 hours	30
Internal Assessment		25
Total		100

Books

1. Construction plannind & management by U K srivatava
2. Construction plannind & management by gahlot and dhir
3. Construction Management and Planning / Sengupta, B.
4. Construction Planning, Equipment, and Methods / Peurifoy, Robert L.

References:

1. Chitkara, K.K. " Construction Project Management Planning ", Scheduling and Control, Tata McGraw Hill Publishing Co., New Delhi, 1998.
2. Calin M. Popescu, Chotchai Charoenngam, " Project planning, Scheduling and Control in Construction: An Encyclopedia of Terms and Applications ", Wiley, New York, 1995.
3. Chris Hendrickson and Tung Au, " Project Management for Construction - Fundamentals Concepts for Owners ", Engineers, Architects and Builders, Prentice Hall, Pitsburgh, 2000.
4. Moder.J., C.Phillips and Davis, " Project Management with CPM ", PERT and Precedence Diagramming, Van Nostrand Reinhold Co., Third Edition, 1983.
5. Willis., E.M., " Scheduling Construction projects ", John Wiley and Sons 1986.
6. Halpin,D.W., " Financial and cost concepts for construction Management ", John Wiley and Sons,New York, 1985.

Electives from PD menu for VIIth and VIIIth Semester

ENTREPRENEURIAL DEVELOPMENT

Course Code: **07B71PD601**
Credit: **03 (3-0-0)**

Objectives: To make the students aware of various processes of new venture creation and the critical knowledge needed to manage business once it is formed.

Content:

Introduction Foundations of Entrepreneurship Inside the Entrepreneurial Mind
Building the Business Plan: **Beginning Considerations** Strategic Management and the Entrepreneur. Forms of Business Ownership and Franchising. Buying an existing Business.
Building the Business Plan: **Marketing Considerations** Building a powerful Marketing Plan E-Commerce and the Entrepreneur Integrated Marketing Communications and Pricing Strategies
Building the Business Plan: **Financial Considerations** Managing Cash Flow Creating a successful Financial Plan
Building a Competitive Edge Leading the growing Company and Planning for Management Succession Global Aspects of Entrepreneurship
Intermittent Guest Lectures E-Commerce, Patenting, Funding agencies, Franchising, opportunities for entrepreneurs, making Proposals & Business Plans, Formation of company

Methodology

The lectures will be supported with laboratory work, which includes case studies, business plan discussions and group presentations. Notification of the laboratory assignments will be made during the lecture.

Books for Reference

Entrepreneurship Development	Zimmrer
Entrepreneurship Development	Anil Kumar

Evaluation System

Test 1	**20**
Test 2	**25**
Test 3	**30**
Presentation	**20**
Attendance	**05**

MANAGING AND MARKETING TECHNOLOGY

Course Code : 07B71PD602
Credit : 03 (3-0-0)

Objective:
The course emphasizes on key concepts and issues underlying the modern practice of marketing. The role of marketing in the organization and in society is examined and analyzed. Course content includes the general nature of marketing in both macro and micro contexts, the marketing concept, buyer behavior, and marketing organization. The marketing process is analyzed through the four main decision areas of products and services, distribution, promotion, and pricing.

Course Content:

UNDERSTANDING MARKETING MANAGEMENT:

- Defining Marketing For 21st Century
- The importance of marketing
- The scope of marketing

DEVELOPING MARKETING STRATEGIES AND CAPTURING MARKETING INSIGHTS:

- Marketing and Customer Value
- Corporate and Division Strategic Planning
- Gathering Information and Scanning the environment
- Analyzing the Macro environment

DEVELOPING THE MARKETING MIX

- Product, Services and Branding Strategies
- New Product Development and Product Life-Cycle Strategies
- Pricing Strategies, Considerations and Approaches
- Marketing Channels and Supply Chain Management
- Advertising, Sales Promotion, personal Selling and Direct Marketing.

CONNECTING WITH CUSTOMERS AND ANALYSING CONSUMER MARKETS

- Creating Customer Value, Satisfaction and Loyalty
- Cultivating Customer Relationship
- What Influences Consumer Behavior?
- The Buying Decision Process

MANAGING MARKETING AND GROWTH

- Creating Competitive Advantage
- The Global Marketplace
- Social Responsibility and Marketing Ethics

Managing a Holistic Marketing Organization

References

1. Kotler, Philip and Gary Armstrong, Principles of Marketing, 10th Edition, New Delhi, Pearson Education, 2004. (Text)
2. Darymple, Douglas J., and Leonard J. Parsons, Marketing Management: Text and Cases, 7th Edition, John Wiley & Sons (Asia) Pte. Ltd., 2002.
3. Kotler, Philip and Kevin Lane Keller, Marketing Management, 12th Edition, New Delhi, Pearson Education, 2006.
4. Winer, Russell S., Marketing Management, 2nd Edition, Prentice Hall, 2003.
5. Dalrymple, Douglas J., and Leonard J. Parsons, 2nd Edition, Wiley Publication, 2000.

Evaluation Scheme

Test I	20 marks
Test II	25 marks
Test III	30 marks
Attendance	5 marks
Project Work	20 marks

TOTAL QUALITY MANAGEMENT

Course Code : 07B81PD603
Credit : 03 (3-0-0)

COURSE OBJECTIVES

For the student to be equipped with the skills and knowledge necessary to implement a successful TQM program in their company, an understanding of the history, purpose and fundamentals of TQM, the tools and techniques that can improve operations, product quality, process quality, customer satisfaction and employee involvement, and the various methods to assess progress of the TQM journey.

Course Content:

Introduction **Basics of Total Quality, Total Quality Management, TQM: Thinkers and Thoughts,** Quality Awards
Features of TQM Cost of Quality, Team work for Quality, Total Employee Involvement, Customer Satisfaction
Continuous Improvement: Quality Circles, Kaizen, Six Sigma, People CMM, Benchmarking
Basic Statistical Concepts: Control of Accuracy and Precision, Process Capability Statistical Process Control, Quality Management Systems, Design of Experiments (Taguchi Technique), FMEA, Total Productivity Maintenance
Quality Standards & Certifications : ISO: 9000 series ISO: 14000 series

Recommended Books

1. Besterfield Dale H., Carol Bestfield-Michna, Glen Besterfield, Sacre Mary Besterfield, Total Quality Management, Third Edition, Pearson Education 2005.
2. Montgomery Douglas C., Introduction to Statistical Quality Control, Fourth Edition, John Wiley & Sons Inc.2003
3. Wadsworth, Modern Methods Quality and Improvement, 2nd edition, CBS Publications, 2004

Evaluation Scheme:

Test 1	20
Test 2	25
Test 3	30
Internal Assessment	25 (Attendance- 5, Presentation - 20)

KNOWLEDGE MANAGEMENT

Course Code : 07B81PD604
Credits : 03 (3-0-0)

Course Content:

Introduction, Types of Knowledge;
Knowledge workers,
Valuing knowledge,
Communities of Practice,
Content management,
Creativity and Innovation
Knowledge management strategies,
Business process and the process-oriented organization,
Information and communication technologies (ICT),
Management of intellectual capital,
Different level of Knowledge management,
Organizational culture,
Developing human capital,
Building and managing the knowledge repository

Recommended Books:

Awad and Ghaziri, Knowledge management, Pearson education
Maier, R Knowledge management systems. Information and communication technology for Knowledge Management

Evaluation Scheme:

Test 1	20
Test 2	25
Test 3	30
Internal Assessment	25 (Attendance- 5, Presentation - 20)