

## **Program outcomes (POs)- Engineering & Technology**

### **Engineering Graduates will be able to:**

**PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12. Life-long learning:** Recognize the need for, and have the preparation and

ability to engage in independent and life-long learning in the broadest context of technological change.

**PROGRAM SPECIFIC OUTCOMES (PSOS)- B.Tech(CIVIL ENGG)**

At the end of the program, the student shall be able to

**PSO 1 :** achieve high level of technical expertise to understand, identify, formulate, design and implement a real life civil engineering problem.

**PSO 2 :** inculcate the value based leadership and ethical qualities in implementing the civil engineering projects.

**PSO 3 :** enhance the need based active participation in infrastructural development for the betterment of society.

**PSO 4 :** foster qualities for life-long learning, working with team spirit with effective communication and powerful interaction with society.

**PSO5 :** get exposure to Industrial Training giving them hands on experience

**MAHARSHI DAYANAND UNIVERSITY, ROHTAK**  
**SCHEME OF STUDIES & EXAMINATIONS B.Tech**  
**2nd YEAR CIVIL ENGINEERING,**  
**3<sup>rd</sup> SEMESTER**  
**Proposed 'F' Scheme w.e.f 2010-11**

Subject Code	Subject Name	L	T	P	Total	Theory Marks	Class Marks	Practical Marks	Total Marks
MAT-201-F Or HUM-201-F	Mathematics-III Or Engineering Economics	3	1	0	4	100	50	0	150
HUM-203-F	Fundamental of Management	3	1	0	4	100	50	0	150
CE-201-F	Structural Analysis-I	3	1	0	4	100	50	0	150
CE-203-F	Building Construction Materials	3	1	0	4	100	50	0	150
CE-205-F	Fluid Mechanics- I	3	1	0	4	100	50	0	150
CE-207-F	Surveying-I	3	1	0	4	100	50	0	150
CE-209-F	Building Drawings	1	0	3	4	0	25	25	50
CE-211-F	Structural Analysis-I Lab	0	0	2	2	0	25	25	50
CE-213-F	Fluid Lab-I Lab	0	0	2	2	0	25	25	50
CE-215-F	Surveying-I Lab	0	0	2	2	0	50	50	100
	<b>Total</b>	<b>19</b>	<b>7</b>	<b>9</b>	<b>35</b>	<b>600</b>	<b>425</b>	<b>125</b>	<b>1150</b>

**MAT-201-F MATHEMATICS-III**  
(Common to CSE, ME, ECE, BME, EE, EEE, E&I, I&C, IT, CE)

L	T	P	Class Work	: 50 Marks
3	1	-	Theory	: 100 Marks
			Total	: 150 Marks
			Duration of Exam.	: 3 Hrs.

**NOTE:** Examiner will set 9 questions in total, with two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal mark (20 marks). Students have to attempt 5 questions in total at least one question from each section.

**Section-A**

Fourier Series and Fourier Transforms : Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and cosine series.

Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

**Section-B**

Functions of Complex Variable: Definition, Exponential function, Trigonometric and Hyperbolic functions, Logarithmic functions. Limit and Continuity of a function, Differentiability and Analyticity.

Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems. Integration of complex functions. Cauchy-Integral theorem and formula.

**Section-C**

Power series, radius and circle of convergence, Taylor's Maclaurin's and Laurent's series. Zeroes and singularities of complex functions, Residues. Evaluation of real integrals using residues (around unit and semi circle only).

Probability Distributions and Hypothesis Testing: Conditional probability, Bayes theorem and its applications, expected value of a random variable. Properties and application of Binomial, Poisson and Normal distributions.

**Section-D**

Testing of a hypothesis, tests of significance for large samples, Student's t-distribution (applications only), Chi-square test of goodness of fit.

Linear Programming: Linear programming problems formulation, solving linear programming problems using (i) Graphical method (ii) Simplex method (iii) Dual simplex method.

**Course Outcomes**

The students will learn:

CO1 - The tool of Fourier series and Fourier Transform for learning advanced Engineering Mathematics.

CO2 - The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

CO3 - The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.

CO4 - The basic ideas of statistics including various discrete and Continuous probability

distributions.

**TEXT BOOKS:**

1. Engineering Mathematics by Babu Ram (Pearson media Publication)
2. Advanced Engg. Mathematics: F Kreyszig.
3. Higher Engg. Mathematics: B.S. Grewal.

**REFERENCE BOOKS:**

1. Advance Engg. Mathematics: R.K. Jain, S.R.K.Iyenger.
2. Advanced Engg. Mathematics: Michael D. Greenberg.
3. Operation Research: H.A. Taha.
4. Probability and statistics for Engineers: Johnson. PHI.

## HUM-201-F ENGINEERING ECONOMICS

(Common to CSE, ME, ECE, BME, EE, EEE, E&I, I&C, IT, CE, TT, FAE, TC)

L T P  
3 1 -

Class Work : 50 Marks  
Theory : 100 Marks  
Total : 150 Marks  
Duration of Exam. : 3 Hrs.

**NOTE:** Examiner will set 9 questions in total, with two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal mark (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

Definition of Economics - various definitions, Nature of Economic problem, Production possibility curve Economic laws and their nature. Relation between Science, Engineering, Technology and Economics.

Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility - its practical application and importance.

### SECTION-B

Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve, Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical importance & applications of the concept of elasticity of demand.

Meaning of production and factors of production; Law of variable proportions, Returns to scale, Internal and External economics and diseconomies of scale.

### SECTION-C

Various concepts of cost - Fixed cost, variable cost, average cost, marginal cost, money cost, real cost opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run.

Meaning of Market, Types of Market - Perfect Competition, Monopoly, Oligopoly, Monopolistic Competition (Main features of these markets)

### SECTION-D

Supply and Law of Supply, Role of Demand & Supply in Price Determination and effect of changes in demand and supply on prices.

Nature and characteristics of Indian economy (brief and elementary introduction), Privatization - meaning, merits and demerits. Globalisation of Indian economy - merits and demerits. Elementary Concepts of VAT, WTO, GATT & TRIPS agreement.

## **COURSE OUTCOMES**

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

CO1 - explain the basic economic principles of wants, scarcity, choice, opportunity cost, etc as applied to business organizations and engineering firms;

CO2 - understand the role of demand and supply law

CO3 - carry out the cost analysis of a manufactured product;

CO4 - fully understand nature and characteristics of Indian Economy

### **TEXT BOOKS:**

1. Principles of Economics: P.N. Chopra (Kalyani Publishers).
2. Modern Economic Theory – K.K. Dewett (S.Chand)

### **REFERENCE BOOKS:**

1. A Text Book of Economic Theory Stonier and Hague (Longman's Landon)
2. Micro Economic Theory – M.L. Jhingan (S.Chand)
3. Micro Economic Theory - H.L. Ahuja (S.Chand)
4. Modern Micro Economics : S.K. Mishra (Pragati Publications)
5. Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co.)
6. Indian Economy: Rudar Dutt & K.P.M. Sundhram

## **HUM-203-F FUNDAMENTALS OF MANAGEMENT**

(Common to CSE, ME, ECE, BME, EE, EEE, E&I, I&C, IT, CE)

L T P  
3 1 -

Class Work : 50 Marks  
Theory : 100 Marks  
Total : 150 Marks  
Duration of Exam. : 3 Hrs.

**NOTE:** Examiner will set 9 questions in total, with two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal mark (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### **Section-A**

Meaning of management, Definitions of Management, Characteristics of management, Management vs. Administration. Management-Art, Science and Profession. Importance of Management. Development of Management thoughts.

Principles of Management. The Management Functions, Inter-relationship of Managerial functions.

Nature and Significance of staffing, Personnel management, Functions of personnel management, Manpower planning, Process of manpower planning, Recruitment, Selection; Promotion - Seniority Vs. Merit. Training - objectives and types of training.

### **Section-B**

Production Management : Definition, Objectives, Functions and Scope, Production Planning and Control; its significance, stages in production planning and control. Brief introduction to the concepts of material management, inventory control; its importance and various methods.

### **Section-C**

Marketing Management - Definition of marketing, marketing concept, objectives & Functions of marketing.

Marketing Research - Meaning; Definition; objectives; Importance; Limitations; Process. Advertising - meaning of advertising, objectives, functions, criticism.

### **Section-D**

Introduction of Financial Management, Objectives of Financial Management, Functions and Importance of Financial Management. Brief Introduction to the concept of capital structure and various sources of finance.

### **Course outcomes:**

Students will be able to understand

CO1 - Evolution of Management and contribution of Management thinkers.

CO2 - importance of staffing and training

CO3 - the concept of material management and inventory control

CO4 - the components of marketing and advertising

CO5 - various sources of finance and capital structure

**TEXT BOOKS:**

1. Principles and Practice of Management - R.S. Gupta, B.D.Sharma, N.S. Bhalla. (Kalyani Publishers)
2. Organisation and Management - R.D. Aggarwal (Tata Mc Graw Hill)

**REFERENCE BOOKS:**

1. Principles & Practices of Management – L.M. Prasad (Sultan Chand & Sons)
2. Management – Harold, Koontz and Cyrilo Donell (Mc.Graw Hill).
3. Marketing Management – S.A. Sherlikar (Himalaya Publishing House, Bombay).
4. Financial Management - I.M. Pandey (Vikas Publishing House, New Delhi)
5. Management - James A.F. Stoner & R.Edward Freeman, PHI.

## CE-201-F STRUCTURAL ANALYSIS-I

L T P  
3 1 -

Class Work : 50 Marks  
Theory : 100 Marks  
Total : 150 Marks  
Duration of Exam. : 3 Hrs.

### SECTION\_A

Unit- I Introduction to structural analysis, Definition of determinate and indeterminate structure, degree of freedom, concept of stress and strain, Mohr's circle of stress and strain, principle stress and strain examples. Stress- strain relationship hook's law, examples, composite sections

### SECTION-B

Unit –II Concept of bending stresses, flexural formula, stress- strain diagram for beam, shear stress in beam, shear stresses in beam with different cross-section. Concept of torsion, torsion in circular shaft, torsion equation, shear stress in shaft due to torsion examples

### SECTION-C

Unit- III Theory of column, slenderness ratio, end connections, short column, Euler's critical buckling load, eccentric loaded short column, cylinder column subjected to eccentric loading, examples

### SECTION-D

Unit- IV Introduction to bending moment and shear force diagram in beam, introduction to slope and deflection in beam by differential equation, moment- area method and conjugate beam method, principle of virtual work, Maxwell law of reciprocal deflection, Willot-Mohr diagram.

### Course Outcomes

CO1 - Students who successfully complete this course will be able to understand the concepts of stress and strain for homogenous, isotropic materials.

CO2 - Help to calculate the stresses and strains in axially-loaded members, circular torsion members, and members subject to flexural loadings.

CO3 - Impart knowledge to determine the stresses and strains in members subjected to combined loading, Principal stresses, maximum shearing stress, and the stresses acting on a structural member.

CO4 - Helps to determine the deflections and rotations produced by the three fundamental types of loads: axial, Torsional, and flexural.

CO5 - Analyze slender, long columns subjected to axial loads.

**BOOKS RECOMMENDED:**

1. Strength of Materials Part-I, S.Timoshenko,Affiliated East-West Press,N.Delhi
2. Mechanics of Materials, Popov Nagarjan & Lu, Prentice Hall of India,N.Delhi
3. Mechanics of Solids, Prasad,V.S. Gakgotia Pub.,N.Delhi.
4. Elementary Structural Analysis, Jain,A.K.,Nem Chand & Bros,Roorkee.
5. Elementary Struictural Analysis, Wibur & Nooris, McGraw Hill Book Co.,Newyork.
6. Structural Analysis, Bhavikatti,S.S.,Vikas Pub.House,N.Delhi.

## CE-203-F BUILDING CONSTRUCTION MATERIALS & DRAWING

L T P  
4 0 2

Class Work : 50 Marks  
Theory : 100 Marks  
Total : 150 Marks  
Duration of Exam. : 3 Hrs.

### SECTION-A

#### Unit-I: Masonry Construction

Introduction, various terms used, stone masonry-Dressing of stones, Classifications of stone masonry, safe permissible loads, Introduction to green building concept and methods, Brick masonry-bonds in brick work, laying brick work, structural brick work-cavity and hollow walls, reinforced brick work, Defects in brick masonry, composite stone and brick masonry, glass block masonry.

#### Unit-II: Cavity and Partition Walls

Advantages, position of cavity, types of non-bearing partitions, constructional details and precautions, construction of masonry cavity wall.

#### Unit-III: Foundation

Functions, types of shallow foundations, sub-surface investigations, geophysical methods, general feature of shallow foundation, foundations in water logged areas, design of masonry wall foundation, introduction to deep foundations i.e. pile and pier foundations.

### SECTION-B

#### Unit-IV: Roofs and Floors

Types of roofs, various terms used, roof trusses-king post truss, queen post truss etc. Floor structures, ground, basement and upper floors, various types of floorings.

#### Unit-V: Doors and Windows

Locations, sizes, types of doors and windows, fixtures and fasteners for doors and windows.

### SECTION-C

#### Unit-VI: Damp-Proofing and Water-Proofing

Defects and causes of dampness, prevention of dampness, materials used, damp-proofing treatment in buildings, water- proofing treatment of roofs including pitched roofs.

#### Unit-VII: Acoustics, Sound Insulations and Fire Protection

Classification, measurement and transmission of sound, sound absorber, classification of absorbers, sound insulation of buildings, wall construction and acoustical design of auditorium, fire-resisting properties of materials, fire resistant construction and fire protection requirements for buildings.

### SECTION-D

#### Unit-VIII: Material for green building,Stones

Classification, requirements of good structural stone, quarrying, blasting and sorting out of stones, dressing, sawing and polishing, prevention and seasoning of stone.

#### Unit-IX: Brick and Tiles

Classification of bricks, constituents of good brick earth, harmful ingredients, manufacturing of bricks, testing of bricks,Bricks prepared from fly ash.

## Course Outcomes

At the end of the course the student should have learnt

CO1 - To identify various building materials and select suitable type of building material for given situation.

CO2 - To be aware of various traditional building materials and also the emerging materials in the field of Civil Engineering construction.

CO3 - To select suitable type of flooring, Plastering, varnishes with their application

Tiles: Terra-cotta, manufacturing of tiles and terra-cotta, types of terra-cotta, uses of terra-cotta.

### Unit-X: Limes, cement and mortars

Classification of lime, manufacturing, artificial hydraulic lime, pozzolona, testing of lime, storage of lime, cements composition, types of cement, manufacturing of ordinary portland cement, testing of cement, special types of cement, storage of cement.

Mortars: Definition, proportions of lime and cement mortars, mortars for masonry and plastering.

### Unit-XI: Timber

Classification of timber, structure of timber, seasoning of timber, defects in timber, fire proofing of timber, plywood, fiber boards, masonite and its manufacturing, important Indian timbers.

### Unit-XII: Paints and Varnishes

Basic constituents of paints, types of paints, painting of wood, constituents of varnishes, characteristics and types of varnishes.

### BOOKS RECOMMENDED:

- 1 Building Construction, Sushil Kumar, Standard Pub., N. Delhi
- 2 Building Material, Rangawala
- 3 Construction Engineering, Y.S. Sane
- 4 Building Construction, Gurcharan Singh, Standard Pub., N. Delhi.

## CE- 205-F FLUID MECHANICS-I

L T P  
3 1 -

Class Work : 50 Marks  
Theory : 100 Marks  
Total : 150 Marks  
Duration of Exam. : 3 Hrs.

### SECTION-A

Unit-I: Introduction: Fluid properties, mass density, specific weight, specific volume and Specific volume and specific gravity, surface tension, capillarity, pressure inside a droplet and bubble due to surface tension, compressibility, viscosity, Newtonian and Non-Newtonian fluids, real and ideal fluids.

Unit-II: Kinematics of Fluid Flow: Steady & unsteady, uniform and non-uniform, laminar & turbulent flows, one, two & three dimensional flows, stream lines, streak lines and path lines, continuity equation in differential form, rotation and circulation, elementary explanation of stream function and velocity potential, rotational and irrotational flows, free and forced vortex flow, graphical and experimental methods of drawing flow nets.

### SECTION-B

Unit-III: Fluid Statics: Pressure-density-height relationship, gauge and absolute pressure, simple differential and sensitive manometers, two liquid manometers, pressure on plane and curved surfaces, centre of pressure, Buoyancy, stability of immersed and floating bodies, determination of metacentric height, fluid masses subjected to uniform acceleration,

### SECTION-C

Unit-IV: Dynamic of Fluid Flow: Euler's equation of motion along a streamline and its integration, limitation of Bernoulli's equation, Pitot tubes, venturimeter, Orificemeter, flow through orifices & mouth pieces, sharp crested weirs and notches, aeration of nappe.

Unit-V: Boundary layer analysis: Boundary layer thicknesses, boundary layer over a flat plate, laminar boundary layer, and turbulent boundary layer, laminar sub-layer, smooth and rough boundaries, local and average friction coefficient, separation and its control.

### SECTION-D

Unit-VI: Dimensional Analysis and Hydraulic Similitude: Dimensional analysis, Buckingham theorem, important dimensionless numbers and their significance, geometric, kinematic and dynamic similarity, model studies, physical modeling, similar and distorted models.

## Course Outcomes

At the end of the course, the student will be able to understand

basic principles of fluid mechanics which includes:

CO1 - Ability to analyze fluid flow problems with the application of the momentum and energy equations.

CO2 - Capability to analyze fluid for kinematic and dynamic flows with different methods.

CO3 - Apply conservation laws to derive governing equations of fluid flows.

CO4 - Student will be able to understand principles of dimensional analysis to design experiments.

**BOOKS RECOMMENDED:**

- 1 Hydraulic and Fluid Mechanic by P.N.Modi & S.M.Seth
- 2 Introduction to Fluid Mechanics by Robert W.Fox & Alan T.McDonald
- 3 Fluid Mechanics Through Problems by R.J.Garde
- 4 Engineering Fluid Mechanics by R.J.Garde & A.G.Mirajgaoker

## CE-207-F SURVEYING-I

L T P  
3 1 -

Class Work : 50 Marks  
Theory : 100 Marks  
Total : 150 Marks  
Duration of Exam. : 3 Hrs.

### SECTION-A

Unit-I: Fundamental Principles of Surveying: Definition, objects, classification, fundamental principles, methods of fixing stations.

Unit-II: Measurement of distances: Direct measurement, instruments for measuring distance, instruments for making stations, chaining of line, errors in chaining, tape corrections examples.

### SECTION-B

Unit-III: Compass and Chain Traversing: Methods of traversing, instruments for measurement of angles-prismatic and surveyor's compass, bearing of lines, local attraction, examples.

Unit-IV: Levelling: Definition of terms used in levelling, types of levels and staff, temporary adjustment of levels, principles of levelling, reduction of levels, booking of staff readings, examples, contouring, characteristics of contours lines, locating contours, interpolation of contours, Calculations of volume of earth works by means of contour lines.

### SECTION-C

Unit-V: Theodolite and Theodolite Traversing: Theodolites, temporary adjustment of theodolite, measurement of angles, repetition and reiteration method, traverse surveying with theodolite, checks in traversing, adjustment of closed traverse, examples, Electronic theodolite.

Unit-VI: Plane Table Surveying: Plane table, methods of plane table surveying, radiation, intersection, traversing and resection, two point and three point problems.

### SECTION-D

Unit-VII: Tacheometry: Uses of tacheometry, principle of tacheometric surveying, instruments used in tacheometry, systems of tacheometric surveying-stadia system fixed hair method, determination of tacheometric constants, tangential systems, examples.

Unit-VIII: Curves: Classification of curves, elements of simple circular curve, location of tangent points-chain and tape methods, instrumental methods, examples of simple curves. Transition Curves-Length and types of transition curves, length of combined curve, examples:

Vertical Curves: Necessity and types of vertical curves.

### Course Outcomes

At the end of the course, the student will be able to

CO1 - Calculate angles, distances and levels.

CO2 - Identify data collection methods and prepare field notes.

CO3 - Understand the working principles of survey instruments using theodolite.

CO4 - Study of different methods using theodolite traversing and plane table surveying.

CO5 - Estimate measurement errors and apply corrections.

**BOOKS RECOMMENDED:**

1. Surveying Vol.I by B.C.Punmia
2. Surveying Vol.I by T.P.Kanitkar

## CE-209-F BUILDING DRAWING

L T P  
1 - 3

Sessional : 25 Marks  
Theory : 25 Marks  
Total : 50 Marks  
Duration of Exam: 3 Hrs

Learn basic engineering drawing formats.

1. Typical drawings of:
  - a) Cavity Wall
  - b) Bonds in brick work
  - c) Grillage foundation
  
2. Preparation of building drawing mentioning its salient features including the following details:
  - a) Ground floor plan
  - b) Two Sectional Elevations
  - c) Front and Side Elevations
  - d) Plan and Sectional Elevation of stair- case, doors/ windows/ ventilators, floor and roof.

### Course Outcomes

- CO1 - Students will be able to draw orthographic projections and sections.
- CO2 - Student's ability to use architectural and engineering scales will increase.
- CO3 - Appreciate types of Drawings for doors, windows etc. And its importance and use building drawing, Symbols, Conventions and Abbreviations.
- CO4 - Apply the Bye laws and Principles of Planning for residential and other public buildings.
- CO5 - Prepare detail planning for single and two storied residential building and public building.

## CE-211-F STRUCTURAL ANALYSIS -I LAB

L T P  
- - 2

Sessional : 25 Marks  
Theory : 25 Marks  
Total : 50 Marks  
Duration of Exam: 3 Hrs

### LIST OF EXPERIMENTS

1. Verification of reciprocal theorem of deflection using a simply supported beam.
2. Verification of moment area theorem for slopes and deflections of the beam.
3. Deflections of a truss- horizontal deflections & vertical deflections of various joints of a pin- jointed truss.
4. Elastic displacements (vertical & horizontal) of curved members.
5. Experimental and analytical study of 3 hinged arch and influence line for horizontal thrust.
6. Experimental and analytical study of behavior of struts with various end conditions.
7. To determine elastic properties of a beam.
8. Uniaxial tension test for steel (plain & deformed bars)
9. Uniaxial compression test on concrete & bricks specimens.

### Course Outcomes

CO1 - To acquire the knowledge about stresses and strains.

CO2 - To get knowledge about loading systems, types of supports and beams and understand the behaviour of different structural system for different loading and deflection.

CO3 - Able to calculate the about forces, moments and deflections.

CO4 - To understand the Able to calculate the deflection of springs

CO5 - To verify and compare different theoretical and experimental theorems.

## CE-213-F FLUID MECHANICS-I LAB

L T P  
- - 2

Sessional : 25 Marks  
Theory : 25 Marks  
Total : 50 Marks  
Duration of Exam: 3 Hrs

### LIST OF EXPERIMENTS

1. Verification of Bernoulli's Theorem
2. Calibration of V notch
- 3 Calibration of Rectangular Notch
4. Calibration of Trapezoidal notch
5. Determination of Metacentric height
- 6 Determination of coefficient  $C_d$ ,  $C_v$  and  $C_c$
- 7 Calibration of Venturimeter
- 8 Calibration of Orifice Plate
- 9 Determination of surface tension of liquids
- 10 Study the properties of vortex flow.

### Course Objective

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

CO1 - Verification of Bernoulli's theorem.

CO2 - Calibration of different notches, venturi and orifice meter.

CO3 - Determination of different coefficient and their verification.

CO4 - Study the different property of fluid flow.

## CE-215-F SURVEYING-I LAB

L T P  
- - 2

Sessional : 25 Marks  
Theory : 25 Marks  
Total : 50 Marks  
Duration of Exam: 3 Hrs

### **LIST OF EXPERIMENTS**

1. Chain surveying: Chaining and chain traversing.
2. Compass traversing.
3. Plane tabling: methods of plane table surveying, two point & three point problems.
4. Leveling: Profile leveling and plotting of longitudinal section and cross sections, Y leveling. Permanent adjustment of level, reciprocal leveling, Contouring and preparation contour map.
5. Use of tangent clinometers.

### **Course Outcomes**

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

CO1 - Verification of Bernoulli's theorem.

CO2 - Calibration of different notches, venturi and orifice meter.

CO3 - Determination of different coefficient and their verification.

CO4 - Study the different property of fluid flow.

**MAHARSHI DAYANAND UNIVERSITY, ROHTAK**  
**SCHEME OF STUDIES & EXAMINATIONS B.Tech**  
**2nd YEAR CIVIL ENGINEERING,**  
**4<sup>th</sup> SEMESTER**  
**Proposed 'F' Scheme effective w.e.f 2010-11**

Subject Code	Subject Name	L	T	P	Total	Theory Marks	Class Marks	Practical Marks	Total Marks
MAT-201-F Or HUM 201-F	Maths III Or Engg. Economics	3	1	0	4	100	50	-	150
CE-202-F	Structural Analysis-II	3	1	0	4	100	50	0	150
CE-204-F	Fluid Mechanics- II	3	1	0	4	100	50	0	150
CE-206-F	Design of Concrete Structures-I	3	1	0	4	100	50	0	150
CE-208-F	Surveying-II	3	1	0	4	100	50	0	150
CE-210-F	Construction and concrete technology	3	1	0	4	100	50	0	150
CE-212-F	Structural Analysis-II Lab	0	0	2	2	0	25	25	50
CE-214-F	Fluid mechanics Lab	0	0	2	2	0	25	25	50
CE-216-F	Surveying Lab	0	0	2	2	0	25	25	50
CE-218-F	Concrete Lab	0	0	2	2	0	25	25	50
GP-202-F	General Proficiency	-	-	2	2	50	-	-	50
<b>Total</b>		<b>18</b>	<b>6</b>	<b>10</b>	<b>34</b>	<b>650</b>	<b>400</b>	<b>100</b>	<b>1150</b>

## MAT-201-F MATHEMATICS-III

L T P  
3 1 -

Class Work : 50 Marks  
Theory : 100 Marks  
Total : 150 Marks  
Duration of Exam. : 3 Hrs.

**NOTE:** Examiner will set 9 questions in total, with two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal mark (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### Section-A

Fourier Series and Fourier Transforms : Euler's formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and cosine series.

Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

### Section-B

Functions of Complex Variable: Definition, Exponential function, Trigonometric and Hyperbolic functions, Logarithmic functions. Limit and Continuity of a function, Differentiability and Analyticity.

Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems. Integration of complex functions. Cauchy-Integral theorem and formula.

### Section-C

Power series, radius and circle of convergence, Taylor's Maclaurin's and Laurent's series. Zeroes and singularities of complex functions, Residues. Evaluation of real integrals using residues (around unit and semi circle only).

Probability Distributions and Hypothesis Testing: Conditional probability, Bayes theorem and its applications, expected value of a random variable. Properties and application of Binomial, Poisson and Normal distributions.

### Section-D

Testing of a hypothesis, tests of significance for large samples, Student's t-distribution (applications only), Chi-square test of goodness of fit.

Linear Programming: Linear programming problems formulation, solving linear programming problems using (i) Graphical method (ii) Simplex method (iii) Dual simplex method.

**Course Outcomes** The students will learn:

CO1 - The tool of Fourier series and Fourier Transform for learning advanced Engineering Mathematics.

CO2 - The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

CO3 - The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.

CO4 - The basic ideas of statistics including various discrete and Continuous probability distributions.

CO5 - The statistical methods of studying data samples.

CO6 - The effective mathematical tools for the solutions of Linear Programming Problem (LPP).

**TEXT BOOKS:**

1. Engineering Mathematics by Babu Ram (Pearson media Publication)
2. Advanced Engg. Mathematics: F Kreyszig.
3. Higher Engg. Mathematics: B.S. Grewal.

**REFERENCE BOOKS:**

1. Advance Engg. Mathematics: R.K. Jain, S.R.K.Iyenger.
2. Advanced Engg. Mathematics: Michael D. Greenberg.
3. Operation Research: H.A. Taha.
4. Probability and statistics for Engineers: Johnson. PHI.

## HUM-201-F ENGINEERING ECONOMICS

L T P  
3 1 -

Class Work : 50 Marks  
Theory : 100 Marks  
Total : 150 Marks  
Duration of Exam. : 3 Hrs.

**NOTE:** Examiner will set 9 questions in total, with two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal mark (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

Definition of Economics - various definitions, Nature of Economic problem, Production possibility curve Economic laws and their nature. Relation between Science, Engineering, Technology and Economics.

Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility - its practical application and importance.

### SECTION-B

Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve, Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical importance & applications of the concept of elasticity of demand.

Meaning of production and factors of production; Law of variable proportions, Returns to scale, Internal and External economics and diseconomies of scale.

### SECTION-C

Various concepts of cost - Fixed cost, variable cost, average cost, marginal cost, money cost, real cost opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run.

Meaning of Market, Types of Market - Perfect Competition, Monopoly, Oligopoly, Monopolistic Competition (Main features of these markets)

### SECTION-D

Supply and Law of Supply, Role of Demand & Supply in Price Determination and effect of changes in demand and supply on prices.

Nature and characteristics of Indian economy (brief and elementary introduction), Privatization - meaning, merits and demerits. Globalisation of Indian economy - merits and demerits. Elementary Concepts of VAT, WTO, GATT & TRIPS agreement.

## Course Outcomes

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

CO1 - Use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil engineering applications such as structural plotting and highway profiling.

- CO2 - Apply the procedures involved in field work and to work as a surveying team.  
CO3 - Plan a survey appropriately with the skill to understand the surroundings.  
CO4 - Take accurate measurements, field booking, plotting and adjustment of errors can be understood.  
CO5 - Plot traverses / sides of building and determine the location of points present on field on a piece of paper

**TEXT BOOKS:**

1. Principles of Economics: P.N. Chopra (Kalyani Publishers).
2. Modern Economic Theory – K.K. Dewett (S.Chand)

**REFERENCE BOOKS:**

1. A Text Book of Economic Theory Stonier and Hague (Longman's Landon)
2. Micro Economic Theory – M.L. Jhingan (S.Chand)
3. Micro Economic Theory - H.L. Ahuja (S.Chand)
4. Modern Micro Economics : S.K. Mishra (Pragati Publications)
5. Economic Theory - A.B.N. Kulkarni & A.B. Kalkundrikar (R.Chand & Co.)
6. Indian Economy: Rudar Dutt & K.P.M. Sundhram

## CE-202 F STRUCTURAL ANALYSIS-II

L	T	P	Sessional	: 50 Marks
3	1	-	Theory	: 100 Marks
			Total	: 150 Marks
			Duration of Exam	: 3 Hrs

**NOTE:** Examiner will set 9 questions in total, with two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal mark (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

Unit-I: Statically Indeterminate Structures-Introduction, Static and Kinematic Indeterminacies, Castigliano's theorems, Strain energy method, Analysis of frames with one or two redundant members using Castigliano's 2nd theorem. Concept of rolling load, design of maximum bending moment, shear force due to rolling load, concept of influence lines in beams, I.L diagram for shear force, B.M., deflection etc.

Unit-II: Slope deflection and moment Distribution Methods- Analysis of continuous beams & portal frames, Portal frames with inclined members.

### SECTION -B

Unit-III: Three hinged arch-horizontal thrust; shear force and bending moment diagrams.

Unit-IV Bending moment and shear force in determinate beams and frames, definition and signs, conventions, axial force, shear force and B.M diagrams.

### SECTION-C

Unit-V: Unsymmetrical Bending Introduction, Centroidal principal axes of sections, Bending stresses in beams subjected to unsymmetrical bending, shear centre, shear centre for channel, Angles and Z sections.

Unit-VI: Cable and suspension Bridges - Introduction, uniformly loaded cables, Temperature stresses, and three hinged stiffening Girder and two hinged stiffening Girder.

### SECTION-D

Unit-VII: Analysis of statically determinate trusses-Introduction, various types, stability, analysis of plane trusses by method of joints and method of sections, analysis of space trusses using tension coefficient method.

### BOOKS RECOMMENDED:

1. Statically Indeterminate Structures, C.K. Wang, McGraw Hill Book Co., New York.
2. Advanced Structural Analysis, A.K. Jain, Nem Chand & Bros., Roorkee.
3. Indeterminate Structures, R.L. Jindal, S. Chand & Co., New Delhi.
4. Theory of Structures, Vol. I, S.P. Gupta & G.S.Pandit, Tata McGraw Hill, New Delhi.

### Course Outcomes

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

- CO1 - Use various classical methods for analysis of indeterminate structures.
- CO2 - Determine the effect of support settlements for indeterminate structures.

CO3 - Apply the concepts of ILD and moving loads on structures.

CO4 - Demonstrate the concepts of qualitative influence line diagram for continuous beams and frames

CO5 - Apply the methods of indeterminate truss analysis demonstrate the behaviour of arches and their methods of analysis.

## CE-204-F FLUID MECHANICS-II

L	T	P	Sessional	: 50 Marks
3	1	-	Theory	: 100 Marks
			Total	: 150 Marks
			Duration of Exam	: 3 Hrs

**NOTE:** Examiner will set 9 questions in total, with two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal mark (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

Unit-I: Turbulent flow: Introduction to turbulent flow, mixing length theory, velocity distribution in turbulent flow, resistance of smooth and artificially roughened pipes, in commercial pipes, aging of pipes. Losses due to sudden expansion and contraction, losses in pipe fittings and valves, concepts of equivalent length of pipe, hydraulic and energy gradient lines, pipes in series, pipes in parallel, branching of pipes, pipe network siphon, water Hammer (only quick closure case). transmission of power through pipelines.

### SECTION-B

Unit-II: Flow in open channels: Uniform flow Basic concepts, Resistance equations (Chezy's and mannings formulae), Uniform flow computations, Efficient channel section, specific energy concept critical flow and its computations, channel transitions.

Unit-III: Flow in open channels: Non-uniform flow gradually varied flow-basic assumptions and dynamic equations of gradually flow. Types of slopes and their characteristics, analysis and computations of flow profiles, brink dept analysis, surges in open channels.

### SECTION-C

Unit-IV: Turbines: Classification definitions, similarity laws, specific speed and unit quantities, Pelton turbines- their construction and settings, speed regulation dimensions of various element. Action of jet, torque, power and efficiency for ideal case, characteristic curves. Reaction turbines

Construction & setting draft tube theory, runaway speed, working proportion of hydraulic turbines and characteristic curves, cavitation. Forces on immersed bodies: types of drag drag on a sphere, a flat plate,

### SECTION-D

Unit-V: Pumps: Centrifugal pumps: Various types and their important components, manometric, total head, net positive suction head, specific speed, shut off head, cavitation. Principle of working and characteristic curves. Priming and maintenance. Submersible pumps.

Reciprocating pumps : principle of working, coefficient of discharge, slip, single acting and double acting pump. Manometric head, Acceleration head, Working of air vessels, simplex, duplex and three throw pumps, construction and discharge. Air lift pump

## **Course Outcomes**

CO1 - Students would be able to understand about Turbulent Flow, Losses in pipe fittings and valves, water hammer, branching of pipes, hydraulic and energy gradient lines, pipe network siphon.

CO2 - Students will understand regarding flow in open channels, efficient channel section, specific energy concept critical flow, types of slopes, brink dept analysis

CO3 - Students would be able to understand about Turbines, specific speed and unit quantities, pelton turbine, action of jet, torque, reaction turbines, construction and setting draft tube theory, forces on immersed bodies.

CO4 - Students will get familiar with centrifugal pumps, various types and their important components, total head, net positive suction head, reciprocating pump, principle of working, single acting and double acting pump, working of air vessels, air lift pump.

## **BOOKS RECOMMENDED:**

1. Fluid Mechanics - Streeter & Wylie.
3. Fluid Mech. & Hyd. M/cs by Modi & Seth
4. Open channel Hydraulics - V.T. Chow.
5. Hydraulic Machines - J.Lal.
6. Fluid Mechanics by A.K. Jain
7. Fluid Mechanics - Subramanyam.

## CE-206 F DESIGN OF CONCRETE STRUCTURES-I

L	T	P	Sessional	: 50 Marks
3	1	-	Theory	: 100 Marks
			Total	: 150 Marks
			Duration of Exam	: 3 Hrs

**NOTE:** Examiner will set 9 questions in total, with two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal mark (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

Unit-I: Elementary treatment of concrete technology: Physical requirements of cement, aggregate, admixture and reinforcement, Strength and durability, shrinkage and creep. Design of concrete mixes, Acceptability criterion, I.S. Specifications.

Unit-II: Design Philosophies in Reinforced Concrete: Working stress and limit state methods, Limit state v/s working stress method, Building code, Normal distribution curve, characteristic strength and characteristics loads, design values, Partial safety factors and factored loads, stress -strain relationship for concrete and steel.

### SECTION-B

Unit-III: Working Stress Method: Basic assumptions, permissible stresses in concrete and steel, design of singly and doubly reinforced rectangular and flanged beams in flexure, steel beam theory, inverted flanged beams, design examples.

Unit-IV: Limit State Method: Basic assumptions, Analysis and design of singly and doubly reinforced rectangular flanged beams, minimum and maximum reinforcement requirement, design examples.

Unit-V: Analysis and Design of Sections in shear, bond and torsion-Diagonal tension, shear reinforcement, development length, Anchorage and flexural bond, Torsional, stiffness, equivalent shear, Torsional reinforcement, Design examples.

### SECTION-C

Unit-VI: Concrete Reinforcement and Detailing-Requirements of good detailing, cover to reinforcement, spacing of reinforcement, reinforcement splicing, Anchoring reinforcing bars in flexure and shear, curtailment of reinforcement.

Unit-VII: Serviceability Limit State -Control of deflection, cracking, slenderness and vibrations, deflection and moment relationship for limiting values of span to depth, limit state of crack width, Design examples.

Unit-VIII: One way and Two Ways Slabs-General considerations, Design of one way and two ways slabs for distributed and concentrated loads, Non-rectangular slabs, openings in slabs, Design Examples

### SECTION-D

Unit-IX: Columns and Footings-Effective length, Minimum eccentricity, short columns under axial compression, Uniaxial and biaxial bending, slender columns, Isolated and wall footings, Design examples.

Unit-X: Retaining Walls-Classification, Forces on retaining walls, design criteria, stability requirements, Proportioning of cantilever retaining walls, counterfort retaining walls, criteria for design of counterforts, design examples.

### **Course Outcomes**

CO1 - Students would understand about cement , aggregate , admixtures ,reinforcement ,shrinkage and creep

CO2 - Students would be able to design beams by WSM and LSM methods of design

CO3 - Students would be able to understand limit state of serviceability and deflection

CO4 - Students would be able to design Slabs, columns, footings retaining walls and counterforts

### **BOOKS RECOMMENDED:**

1. Design of Reinforced Concrete Structures,P.Dayaratnam,Oxford & IBH Pub.,N.Delhi.
2. Reinforced Concrete-Limit State Design, A.K.Jain, Nem Chand & Bros.,Roorkee.
3. Reinforced Concrete, I.C.Syal & A,K,Goel, A.H,Wheeler & Co.Delhi.
4. Reinforced Concrete Design, S.N.Sinha, TMH Pub.,N.Delhi.
5. SP-16(S&T)-1980, Design Aids for Reinforced Concrete to IS:456, BIS, N.Delhi.
6. SP-34(S&T)-1987 Handbook on Concrete Reinforcement and Detailing`, BIS, N.Delhi.

## CE-208 F SURVEYING-II

L	T	P	Sessional	: 50 Marks
3	1	-	Theory	: 100 Marks
			Total	: 150 Marks
			Duration of Exam	: 3 Hrs

**NOTE:** Examiner will set 9 questions in total, with two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal mark (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

Unit-I: Trigonometrically Leveling: Introduction, height and distances-base of the object accessible, base of object inaccessible, geodetical observation, refraction and curvature, axis signal correction, difference in elevation between two points.

Unit-II: Triangulation: Triangulation systems, classification, strength of figure, selection of triangulation stations, grade of triangulation, field work of triangulation, triangulation computations, introduction to E.D.M. instruments.

### SECTION-B

Unit-III: Survey Adjustment and Treatment of Observations: Definite weight of an observation, most probable values, type of error, principle of least squares, and adjustment of triangulation figures by method of least squares.

Unit-IV: Astronomy: Definitions of astronomical terms, star at elongation, star at prime vertical star at horizon, star at culmination, celestial coordinate systems, Napier's rule of circular parts, various time systems: sidereal, apparent, solar and mean solar time, equation of time-its cause, effect, determination of longitude, inter-conversion of time, determination of time, azimuth and latitude by astronomical observations.

### SECTION-C

Unit-V: Elements of Photogrammetry: Introduction: types of photographs, Terrestrial and aerial photographs aerial camera and height displacements in vertical photographs, stereoscopic vision and stereoscopies, height determination from parallax measurement, flight planning, plotting by radiline method, principle of photo interpretation and photogram metric monitoring in Civil Engineering.

### SECTION-D

Unit-VI: Introduction of remote sensing and its systems. Analysis /measurements on remote sensing analysis and interpretation of data

Unit-VII: Concept of G.I.S and G.P.S-Basic Components, data input, storage & output.

### Course Outcomes

- CO1 - To be able to do various type of levelling
- CO2 - To be able to work with various survey adjustment techniques
- CO3 - Have a knowledge of various type of elements of photogrammetry
- CO4 - Have a knowledge of remote sensing and its systems
- CO5 - Have a knowledge about GPS and GIS

**BOOKS RECOMMENDED:**

1. Surveying Vol.2 by B.C.Punmia
2. Surveying Vol.3 by B.C.Punmia
3. Surveying Vol.2 by T.P.Kanitkar

## CE-210-F CONSTRUCTION & CONCRETE TECHNOLOGY

L	T	P	Sessional	: 50 Marks
3	1	-	Theory	: 100 Marks
			Total	: 150 Marks
			Duration of Exam	: 3 Hrs

**NOTE:** Examiner will set 9 questions in total, with two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal mark (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

Unit – I: CPM - Project Management, Bar Chart and Milestone Charts, Elements of network, development of network, network analysis.

### SECTION-B

Unit – II: Concrete Technology - Concrete making materials: cements, aggregates, water, admixtures, properties of fresh and hardened concrete, variability of concrete strength, extreme weather concreting, Testing of concrete mixes, prestressed concrete.

### SECTION-C

Unit – III: Mix Design-Principles of concrete mix design, basic considerations, Factors in the choice of mix design, outline of mix design procedure, ACI mix design practice, USBR method, British mix design method IS guidelines.

### SECTION-D

Unit – IV: Heavy Construction - Construction of large structures, dams, bridges, multi-storeyed buildings etc.

Unit – V: Construction Equipments - Introduction to heavy construction equipment, crushers, hot mix, plants, dozers etc.

### BOOKS RECOMMENDED:

1. Handbook of mix design - BIS
2. PERT & CPM by B.C. Punmia
3. Concrete Technology by M.S. Shetty.

### Course Outcomes

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

CO1 - Design the concrete mix using ACI and IS code methods.

CO2 - Determine the properties of fresh and hardened of concrete.

CO3 - Design special concretes and their specific applications ensure quality control while testing/ sampling and acceptance criteria

## CE-212-F STRUCTURAL ANALYSIS -II LAB

L T P  
- - 2

Sessional : 25 Marks  
Theory : 25 Marks  
Total : 50 Marks  
Duration of Exam: 3 Hrs

### LIST OF EXPERIMENTS:

1. Experiment on a two- hinged arch for horizontal thrust & influence line for Horizontal thrust
2. Experimental and analytical study of a 3 bar pin jointed Truss.
3. Experimental and analytical study of deflections for unsymmetrical bending of a Cantilever beam.
4. Begg`s deformeter- verification of Muller Breslau principle.
5. Experimental and analytical study of an elastically coupled beam.
6. Sway in portal frames - demonstration.
7. To study the cable geometry and statics for different loading conditions.
8. To plot stress-strain curve for concrete. Use of mechanical and electrical strain and stress gauges.

### Course Outcomes

In this lab. Students will understand the concept of:

CO1 - Various experimental and analytical studies for different structural members and their comparison.

CO2 - Demonstration of frame.

CO3 - Experimental study of Stress strain curve for concrete etc.

## CE-214-F FLUID MECHANICS- LAB

L T P  
- - 2

Sessional : 25 Marks  
Theory : 25 Marks  
Total : 50 Marks  
Duration of Exam: 3 Hrs

### LIST OF EXPERIMENTS

1. To determine the coefficient of drag by Stokes law for spherical bodies.
2. To study the phenomenon of cavitation in pipe flow.
3. To determine the critical Reynolds number for flow through commercial pipes.
4. To determine the coefficient of discharge for flow over a broad crested weir.
5. To study the characteristics of a hydraulic jump on a horizontal floor and sloping glacis including friction blocks.
6. To study the scouring phenomenon around a bridge pier model.
7. To study the scouring phenomenon for flow past a spur.
8. To determine the characteristics of a centrifugal pump.
9. To study the momentum characteristics of a given jet.
10. To determine head loss due to various pipe fittings.

### Course Outcomes

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

- CO1 - Measure discharge in pipes determines the energy loss in conduits.
- CO2 - Demonstrate the characteristics curves of pumps.
- CO3 - Demonstrate the characteristics curves of turbines.
- CO4 - Carry out discharge measurements in open channel etc.

## CE-216-F SURVEYING-II LAB

L T P  
- - 2

Sessional : 25 Marks  
Theory : 25 Marks  
Total : 50 Marks  
Duration of Exam: 3 Hrs

### LIST OF EXPERIMENTS

1. Theodilite: Study of theodolite, measurement of horizontal angle, measurement of vertical angle, Permanent adjustment.
2. Tachometry: Tachometric constants, calculating horizontal distance and elevations with the help of tachometer.
3. Setting of simple circular curves by off set method, off set from chord produced, off set from long chord and by deflection angle method.
4. An exercise of triangulation including base line measurement.

### Course Outcomes

CO1 - To be able to work with theodolite, measurement of horizontal angle, measurement of vertical angle, Permanent adjustment.

CO2 - To have a knowledge about Tachometric constants, calculating horizontal distance and elevations with the help of tachometer.

CO3 - To be able to make a simple circular curve by offset method, off set from chord produced, off set from long chord and by deflection angle method.

CO4 - To have a knowledge of triangulation including base line measurement.

## CE- 218-F CONCRETE LAB

L T P  
- - 2

Sessional : 25Marks  
Theory : 25Marks  
Total : 50Marks  
Duration of Exam: 3 Hrs

### TESTS ON CEMENT

- 1 Standard consistency of cement using Vicat's apparatus.
- 2 Fineness of cement by Sieve analysis and Blaine's air permeability method. 3  
Soundness of cement by Le-Chatelier's apparatus.
- 4 Setting time of cement, initial and final.
- 5 Compressive strength of cement.
- 6 Measurement of specific gravity of cement.
- 7 Measurement of Heat of Hydration of cement.

### TESTS ON AGGREGATES

- 1 Moisture content and bulking of fine aggregate.
- 2 Fineness modulus of coarse and fine aggregates.

### TESTS ON CONCRETE

- 1 Workability of cement concrete by (a) Slump test (b) Compaction factor test  
(c) Flow table test
- 2 Compressive strength of concrete by (a) Cube test, (b) Cylinder test
- 3 Indirect tensile strength of concrete-split cylinder test.
- 4 Modules of rupture of concrete by flexure test
- 5 Bond strength between steel bar and concrete by pull-out test
- 6 Non-destructive testing of concrete

### BOOKS RECOMMENDED:

- 1 Concrete Manual-M.L.Gambhir, Dhanpat Rai & Sons, N.Delhi.
- 2 Concrete Technology-M.L.Gambhir, Tata McGraw Hill, N.Delhi

### Course Outcomes

In this lab. Student will understand the:

- CO1 - Theoretical properties and experimental properties of different material.
- CO2 - Study of various properties of cement, aggregate and concrete for site work.
- CO3 - Checking of suitability of material for practical application

## GP-202-F GENERAL PROFICIENCY

L T P  
- - 2

Sessional : 50 Marks

Total : 50 Marks

Duration of Exam: 3 Hrs

- Quiz & Aptitude,
- Comprehension,
- Communication for Specifics,
- Let's speak,
- Composition Skills –Formal Letter Writing based on the trends in practice in corporate culture.
- Training on etiquettes & manners should be carried further and be observed during the general classes
- Ethics in Engineering

### Course Outcomes

CO1 - Impart confidence in student to face real life problems and situations.

CO2 - Build communication skill and aptitude.

CO3 - Build manner in student

**MAHARSHI DAYANAND UNIVERSITY, ROHTAK**  
**SCHEME OF STUDIES & EXAMINATIONS**  
**B.Tech. 3<sup>rd</sup> YEAR CIVIL ENGINEERING, SEMESTER- V**  
**Proposed “F” Scheme effective from 2011-12**

Subject Code	Subject Name	L	T	P	Total	Sessional Marks	Theory Marks	Sem Practical Marks	Total Marks
CE-301-F	Design of Steel Structure- I	3	1	-	4	50	100	0	150
CE-303-F	Transportation Engg.-I	3	1	0	4	50	100	0	150
CE-305-F	Water Supply-Treatment	3	1	0	4	50	100	0	150
CE-307-F	Soil Mechanics	3	1	0	4	50	100	0	150
CE-309-F	Numerical Methods And Computing Techniques	3	1	0	4	50	100	0	150
CE-311-F	Hydrology	3	1	0	4	50	100	0	150
CE-313 F	DSS-Drg.Lab	2	0	3	5	25	-	25	50
CE-315-F	Soil Mechanics Lab	0	0	2	2	25	0	25	50
CE-317 F	Transportation Lab-I	0	0	2	2	25	0	25	50
CE-319-F	Survey Camp	0	0	0	0	50	0	0	50
CE-321-F	Auto Cad Lab	0	0	2	2	25	0	25	50
	Total	20	6	9	35	450	600	100	1150

**Note:**

4. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.
5. Assessment of Practical Training-I, undergone at the end of IV semester, will be based on seminar, viva-voce, report and certificate of practical training obtained by the student from the industry. According to performance letter grades A, B, C, F are to be awarded. A student who is awarded 'F' grade is required to repeat Practical Training.

## CE-301 F DESIGN OF STEEL STRUCTURES-I

L T P  
3 1

Sessional: 50 Marks  
Theory : 100 Marks  
Total : 150 Marks  
Duration of exam : 3Hrs.

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

Unit-I: Introduction: Properties of structural steel. I.S.Rolled sections and I.S. specifications.

Unit-II: Connections: Importance, various types of connections, simple and moment resistant, riveted, bolted and welded connections.

Unit-III: Design of Tension Members: Introduction, types of tension members, net sectional areas, design of tension members, lug angles and splices.

### SECTION-B

Unit-IV: Design of Compression Members: Introduction, effective length and slenderness ratio, various types of sections used for columns, built up columns, necessity, design of built up columns, laced and battened columns including the design of lacing and battens, design of eccentrically loaded compression members.

Unit-V: Column Bases and Footings: Introduction, types of column bases, design of slab base and gusseted base, design of gusseted base subjected to eccentrically loading, design of grillage foundations.

### SECTION-C

Unit-VI: Design of Beams: Introduction, types of sections, general design criteria for beams, design of laterally supported and unsupported beams, design of built up beams, web buckling, web crippling and diagonal buckling.

Unit-VII: Gantry Girders: Introduction, various loads, specifications, design of gantry girder.

### SECTION-D

Unit-VIII: Plate Girder: Introduction, elements of plate girder, design steps of a plate girder, necessity of stiffeners in plate girder, various types of stiffeners, web and flange splices (brief introduction), Curtailment of flange plates, design beam to column connections: Introduction, design of framed and seat connection.

## Course Outcomes

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

CO1 - Apply the IS code of practice for the design of steel structural elements.

CO2 - Design compression and tension members using simple and built-up sections.

CO3 - Calculate forces on the various members of the truss and design them.

CO4 - Analyze the behaviour of bolted connections and design them.

CO5 - Design welded connections for both axial and eccentric forces.

**Books Recommended:**

1.Design of steel structures, A.S.Arya & J.L.Ajmani, Nem chand & Bros., Roorkee.

2.Design of steel structures, M.Raghupati, TMH Pub., New Delhi.

3.Design of steel structures, S.M.A.Kazmi & S.K.Jindal, Prentice Hall, New Delhi.

4.Design of steel structures, S.K.Duggal, TMH Pub, New Delhi.

## CE-310 F TRANSPORTATION ENGINEERING- I

L T P  
3 1 -

Sessional: 50 Marks  
Theory : 100 Marks -  
Total : 150 Marks  
Duration of exam: 3 Hrs.

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

#### UNIT-I

Highway Plans, Highway Alignment and Surveys

Main features of 20 years road development plans in India. Requirement of an ideal high way alignment. Factors affecting alignment, Surveys for high way alignments.

Classifications of roads. Objectives of highway planning. surveys Saturation system of planning.

#### UNIT –II

Cross section elements and sight distance considerations.-Cross section elements, friction, carriage way, formation width, land width, camber,IRC recommended values. Types of terrain design speed, sight distance ,stopping sight distance, overtaking sight distance ,overtaking zones, intermediate sight distance ,sight distance at inter sections, head light sight distance, set back distance.Critical locations for sight distance.

### SECTION-B

#### UNIT –III

Design of horizontal and vertical alignments-

Effects of centrifugal force. Design of super elevation. Providing super elevation in the field.Radios of circular curves. Extra widening. Type and length of transition curves.Gradient, types, values.Smooth curves and valley curves, their design criterions. Grade compensation on curves.

#### UNIT-IV

Traffic characteristics and traffic surveys, road user and vehicular characteristics .Traffic studies such as volume, speed and O & D studies. Parking and accident studies. Fundamental diagram of traffic flows. Level of service.PCU.Capacity for non urban roads. Causes and preventing measures for road accidents.

### SECTION-B

#### UNIT –V

High way materials

Sub grade soil evaluation, CBR test, plate bearing test, desirable properties of aggregates, various tests, testing procedures and IRC/IS specifications for suitability of aggregates

Types of Bituminous materials.

Bitumen, tar, Cut back, emulsions. Various tests, testing procedures and IRS/IS specifications for stability of bituminous materials in road construction. Bituminous mix, desirable properties. Marshall method of mix design. Basic concept of use of polymers and rubber modified bitumen in bituminous mixes.

## SECTION-C

### UNIT –VI

Rail way Transport

System of rail ways, permanent ways, components, requirements of gauge, gauge, types of gauges, rails, function of rails, composition, types of rails, length of rail, rail joints, type of rail joints, coning and wheel, tilting, failure of rails, creeps, wearing, buckling, welding, Sleepers, Types of sleepers, Functions, Requirements, Ballasts, Functions, Types of ballast size and sections, and quantities, fixture and fastening, function, type of fastening, requirements, spikes, types of spikes, bolts, keys,.

## SECTION-D

### UNIT-VII

Track geometries, gradients, types of gradients, curves, types of curves, super elevations, relation super elevation with gauge, speed and radius of curves, pointing crossing, technical terms, turn out, switches, type of switches, crossings, type of crossing, junction, type of junction, plating, method of plating, relaying of track, method of relaying of track, railway station, purpose, site selection, requirements, classification of stations, yards, classification of yards, necessity of equipments, level crossing, signals, classification of signals, interlocking, method of inter locking, Maintenance and drainage, classification of maintenance.

### UNIT –VIII

Tunnels-Necessity of tunnels, classification of tunnels, shape of tunnels, cross section of tunnels, surveying of tunnels, shafts, purpose of shafts, construction of shafts, lining of tunnels, types of lining, construction of lining and methods of lining. Maintenance and drainage of tunnels.

### **Course Outcomes:**

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

- CO1 - Carry out surveys involved in planning and highway alignment.
- CO2 - Design cross section elements, sight distance, horizontal and vertical alignment.
- CO3 - Implement traffic studies, traffic regulations and control, and intersection design.
- CO4 - Determine the characteristics of pavement materials.
- CO5 - Design flexible and rigid pavements as per IRC.

**Books Recommended:**

1. Highway Engg by S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.
2. Principles and Practice of Highway Engg. by L.R.Kadiyali, Khanna Publishers, Delhi.
3. Principles of Pavement Design by Yoder,E.J & Witzak,M.W., John Wiley and Sons, USA.
4. Tunnel Engineering by S.C.Saxena, Dhanpat Rai Publications, N.Delhi.
5. A text book of Tunnel, Bridges and Railway Engg. by S.P.Bindra, Dhanpat Rai Delhi.

Railway Engineering by N.L.Arora

## CE-305 F WATER SUPPLY AND TREATMENT

L T P

3 1 -

Sessional: 50 Marks

Theory : 100 Marks -

Total : 150 Marks

Duration of exam: 3 Hrs.

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

Unit-I: Water Quantity: Importance and necessity of water supply scheme. Water demands and its variations. Estimation of total quantity of water requirement. Population forecasting. Quality and quantity of surface and ground water sources. Selection of a source of water supply. Types of intakes.

Unit-II: Water Quality: Impurities in water and their sanitary significance. Physical, chemical and bacteriological analysis of water, water borne diseases, water quality standards.

### SECTION-B

Unit-III: Water Treatment: Objectives, treatment processes and their sequence in conventional treatment plant, sedimentation – plain and aided with coagulation. Types, features and design aspects. Mixing basins and Flocculation units. Filtration – mechanism involved, types of filters, slow and rapid sand filtration units (features and design aspects), Disinfection principles and aeration.

Other water treatment processes: Purification processes in natural systems, water softening, removal of taste and odour, advanced methods of water treatment, deflouridation, dissolved solids removal.

### SECTION-C

Unit-IV: Water Conveyance System: Conveyance of water, Intake structures, Rising and Gravity system, Dual systems, Pumping Systems and pumping stations, valves and appurtenances, pipe materials and pipe fitting, O&M and trouble shooting for conveyance system.

### SECTION-D

Unit-V: Water Distribution System: Layout of Distribution system – Dead End system, Grid Iron system, Ring system, Radial system, their merits and demerits, Distribution Reservoir- functions and

determination of storage capacity, Water Distribution Network, analysis of distribution network, layout, capacity and pressure requirements, leak detection, Maintenance, Water supply in buildings and plumbing.

## **Course Outcomes**

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

CO1 - Identify the source of water and water demand.

CO2 - Apply the water treatment concept and methods.

CO3 - Students will have an understanding of the distribution system..

CO4 - Students will have an understanding of the basic principles behind each water treatment unit.

CO5 - Students will get thorough idea about functions of water supply systems.

### Books Recommended:

1. Water Supply and Sewerage: E.W. Steel.
2. Water Supply and Sewage by Terence J. McGhee.
3. Water Supply Engineering: S.R. Kshirsagar.
4. Water Supply Engineering: S.K. Garg.
5. Water Supply Engineering: B.C. Punmia, Ashok Jain & Arun Jain.
6. Manual on Water Supply and Treatment: Ministry of Urban Dev., New Delhi.
7. Water Supply Waste Disposal and Environmental Pollution Engineering by A.K. Chatterjee.
8. Elements of Public Health Engineering by K.N. Duggal.
9. Water Supply and Sanitary Engineering by G.S. Birdie and J.S. Birdie.
10. Environmental Engineering by Howard S. Peavy, Donald R. Rowe and George Tchobanoglous.
11. Water and Waste Water Technology by Mark T Hammer.

## CE- 307 F SOIL MECHANICS

L T P 3

1 -

Sessional: 50 Marks

Theory : 100 Marks -

Total : 150 Marks

Duration of exam: 3 Hrs.

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

#### Unit-I: Soil Formation and Composition

Introduction, soil and rock, Soil Mechanics and Foundation Engineering, origin of soils, weathering, soil formation, major soil deposits of India, particle size, particle shape, inter-particle forces, soil structure, principal clay minerals.

#### Unit-II: Basic Soil Properties

Introduction, three phase system, weight-volume relationships, soil grain properties, soil aggregate properties, grain size analysis, sieve analysis, sedimentation analysis, grain size distribution curves, consistency of soils, consistency limits and their determination, activity of clays, relative density of sands.

#### Unit-III: Classification of soils

Purpose of classification, classification on the basis of grain size, classification on the basis of plasticity, plasticity chart, Indian Standard Classification System.

Unit-IV: Permeability of Soils  
Introduction, Darcy's law and its validity, discharge velocity and seepage velocity, factors affecting permeability, laboratory determination of coefficient of permeability, determination of field permeability, permeability of stratified deposits.

### SECTION-B

#### Unit-IV: Effective Stress Concept

Principle of effective stress, effective stress under hydrostatic conditions, capillary rise in soils, effective stress in the zone of capillary rise, effective stress under steady state hydro-dynamic conditions, seepage force, quick condition, critical hydraulic gradient, two dimensional flow, Laplace's equation, properties and utilities of flow net, graphical method of construction of flow nets, piping, protective filter.

#### Unit-V: Compaction

Introduction, role of moisture and compactive effect in compaction, laboratory determination of optimum moisture content, moisture density relationship, compaction in field, compaction of cohesionless soils, moderately cohesive soils and clays, field control of compaction.

## SECTION-C

### Unit-VI: Vertical Stress Below Applied Loads

Introduction, Boussinesq's equation, vertical stress distribution diagrams, vertical stress beneath loaded areas, Newmark's influence chart, approximate stress distribution methods for loaded areas, Westergaard's analysis, contact pressure.

### Unit-VII: Compressibility and Consolidation

Introduction, components of total settlement, consolidation process, one-dimensional consolidation test, typical void ratio-pressure relationships for sands and clays, normally consolidated and over consolidated clays, Casagrande's graphical method of estimating pre-consolidation pressure, Terzaghi's theory of one-dimensional primary consolidation, determination of coefficients of consolidation, consolidation settlement, Construction period settlement, secondary consolidation.

## SECTION-D

### Unit-VIII: Shear Strength

Introduction, Mohr stress circle, Mohr-Coulomb failure-criterion, relationship between principal stresses at failure, shear tests, direct shear test, unconfined compression test, tri-axial compression tests, drainage conditions and strength parameters, Vane shear test, shear strength characteristics of sands, normally consolidated clays, over-consolidated clays and partially saturated soils, sensitivity and thixotropy.

### Unit-IX: Earth Pressure

Introduction, earth pressure at rest, Rankine's active & passive states of plastic equilibrium, Rankine's earth pressure theory, Coulomb's earth pressure theory, Culmann's graphical construction, Rebhann's construction.

## Course Outcomes

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

CO1 - Carry out soil classification.

CO2 - Solve three phase system problems.

CO3 - Solve any practical problems related to soil stresses estimation, permeability and seepage including flow net diagram.

CO4 - Estimate the stresses under any system of foundation loads.

CO5 - Solve practical problems related to consolidation settlement and time rate of settlement.

### Books Recommended:

1. Basic and Applied Soil Mechanics by Gopal Ranjan, ASR Rao, New Age International(P)Ltd.Pub.N.Delhi.

2. Soil Engg. in Theory and Practice, Vol .I, Fundamentals and General Principles by Alam Singh, CBS Pub.,N.Delhi.

3. Engg. Properties of Soils by S.K.Gulati, Tata-Mcgraw Hill,N.Delhi.

4. Geotechnical Engg. by P.Purshotam Raj, Tata Mcgraw Hill.

5. Principles of Geotechnical Engineering by B.M.Das,PWS KENT, Boston.

## CE-309-F NUMERICAL METHODS

L T P

3 1 -

Sessional: 50 Marks

Theory : 100 Marks

Total : 150 Marks

Duration of exam: 3 Hrs.

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

Interpolation and curve fitting : Interpolation problem, Lagrangian polynomials, Divided differences, Interpolating with a cubic spline, Bezier curves and B-spline curves, Least square approximations.

Non-Linear Equations : Bisection method, Linear Interpolation methods, Newton's method, Muller's method, fixed-point method.

### SECTION-B

Simultaneous Linear Equations : Elimination method, Gauss and Gauss-Jordan method, Jacobi's method, Gauss-Seidal method, Relaxation method.

Numerical Differentiation and Integration : Derivatives from differences tables, Higher order derivatives, Extrapolation techniques, Newton-cotes integration formula, Trapezoidal rule, Simpson's rules, Boole's rule and Weddle's rule, Romberg's Integration.

### SECTION--C

Numerical Solution of Ordinary Differential Equations : Taylor series method, Euler and modified Euler method, Runge-Kutta methods, Milne's method, Adams-Moulton method, Power method for Eigen values by iteration.

Roots of equation; Graphical methods, Newton Raphson,s methods, Solution of ordinary differential equation by Runge Kutta Method. Solution of linear algebraic equations by Relaxation Methods

### SECTION-D

Numerical Solution of Partial Differential Equations : Finite difference approximations of partial derivatives, solution of Laplace equation (Standard 5-point formula only), one-dimensional heat equation (Schmidt method, Crank-Nicolson method, Dufort and Frankel method) and wave equation.

Numerical Interpolation; Linear and Lagrangian Interpolation .Numerical intergration.Trapezoidal andSimpson,s Rule. Curve fitting. Linear and polynomial regression. Curve fitting. Linear and polynomial regression.

**Course Outcomes** Students would be able to

CO1 - Evaluate numerical differentiation and numerical integration using iterative methods.

CO2 - To find the solution of transcendental and linear equation using several numerical methods

CO3 - Solve ordinary and partial differential equations of first order using several numerical Technique

TEXT BOOKS :

1. Applied Numerical Analysis : Curtis F. Gerald and Patrick G. Wheatley-Pearson, Education Ltd.
2. Numerical Method : E. Balagurusamy T.M.H.

REFERENCE BOOKS :

1. Numerical Methods for Scientific and Engg. Computations : M.K. Jain, .R.K. Iyenger and R.K. Jain-Wiley Eastern Ltd.
2. Introductory Methods of Numerical Analysis S.S. Sastry,P.H.I.
3. Numerical Methods in Engg. & Science : B.S. Grewal.

## **CE-311-F HYDROLOGY**

L T P 3

1 -

Sessional: 50 Marks

Theory

Total : 150 Marks

Duration of exam: 3 Hrs. Note:

Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### **SECTION-A**

Unit-I: Introduction: Hydrologic cycle, scope and application of hydrology to engineering problems, drainage basins and its characteristics, stream geometry, hypsometric curves.

Unit-II: Precipitation: Forms and types of precipitation, characteristics of precipitation in India, measurement of precipitation, recording and non recording raingages, raingage station, raingage network, estimation of missing data, presentation of rainfall data, mean precipitation, depth -area -duration relationship, frequency of point rainfall, intensity -duration- frequency curves, probable max. precipitation.

### **SECTION-B**

Unit-III: Evaporation & Transpiration: Process, evaporimeters and empirical relationships, analytical method, reservoir evaporation and methods of its control, transpiration, evapo-transpiration and its measurement, Penman's equation and potential evapo-transpiration.

Unit-IV: Infiltration: Infiltration process, initial loss, infiltration capacity and measurement of infiltration, infiltration indices.

### **SECTION-C**

Unit-V: Runoff: Factor affecting run-off, estimation of runoff, rainfall-run off relationships, measurement of stage-staff gauge, wire gauge, automatic stage recorder and stage hydrograph, measurement of velocity-current meters, floats, area velocity method, moving boat and slope area method, electromagnetic, ultra-sonic and dilution methods of stream flow measurement, stage discharge relationship.

Unit-VI: Hydrograph: Discharge hydrograph, components and factors affecting shape of hydrograph, effective rainfall, unit hydrograph and its derivation, unit hydrograph of different durations, use and limitations of UH, triangular UH, Snyder's synthetic UH, floods, rational methods, empirical formulae, UH method, flood frequency methods, Gumbel's method, graphical method, design flood.

### **SECTION-D**

Unit-VII: Ground Water: Occurrence, types of aquifers, compressibility of aquifers, water table and its effects on fluctuations, wells and springs, movement of ground water, Darcy's law, permeability and its determination, porosity, specific yield and specific retention, storage coefficient, transmissibility.

Unit-VIII: Well Hydraulics: Steady state flow to wells in unconfined and confined aquifers.

## **Course Outcomes**

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

CO1 - Demonstrate the concepts of hydrograph, S-hydrograph, Unit hydrograph and IUH.

CO2 - Estimate the hydrological parameters.

CO3 - Carry out statistical and probability analysis of hydrological data.

CO4 - Demonstrate the concepts of hydrological systems.

CO5 - Develop regression models for the analysis of hydrological data

### Books Recommended:

1 Engineering Hydrology by K.Subramanya.

2 Hydrology by H.M.Raghunath.

3 Hydrology for Engineers by Linsely, Kohler, Paulhus.

4 Elementary Hydrology by V.P.Singh.

## CE-315 F SOIL MECHANICS LAB

L T P

- - 2

Sessional: 25 Marks

Exam : 25 Marks -

Duration of exam: 3 Hrs.

### List of Experiments:

1. Visual Soil Classification and water content determination.
2. Determination of specific gravity of soil solids.
3. Grain size analysis-sieve analysis.
4. Liquid limit and plastic limit determination.
5. Field density by:
  - Sand replacement method
  - Core cutter method
6. Proctor's compaction test.
7. Coefficient of permeability of soils.
8. Unconfined compressive strength test.
9. Direct shear test on granular soil sample.
10. Unconsolidated undrained(UU) triaxial shear test of fine grained soil sample.

### **Course Outcomes**

At the end of the course, students would be able to:

CO1 - Determine index properties of soils.

CO2 - Students will learn and acquire knowledge to classify soils.

CO3 - To understand the techniques, skills and modern engineering tools necessary for engineering practice.

CO4 - Determine engineering properties of soils solutions.

CO5 - Classify soil by physical observation of the soils.

### Books Recommended:

- 1 Soil Testing for Engineers by S.Prakash, PK Jain, Nem Chand & Bros.,Roorkee. 2 Engineering Soil Testing by Lambi, Wiley Eastern.

3 Engineering Properties of Soils and their Measurement by J.P.Bowles, McGraw Hill.

4 Soil Engineering in Theory and Practice, Vol.II, Geotechnical Testing and Instrumentation  
by Alam Singh, CBS Pub.

## CE-321 F Auto Cad Lab

L T P  
- - 2

Sessional: 25 Marks  
Exam : 25 Marks -  
Total : 50 Marks  
Duration of exam: 3 Hrs.

### **Introduction to CAD:**

Introduction to interactive computing and use of graphics requirement of interactive computing dedicated v/s time sharing models interactive interface.

Computer Aided Drafting Introduction

Auto CAD Basic drawing and editing ,

Commands for 2d drawings, simple drawing exercise... for application of auto cad commands

Advanced 2d drafting using, auto cad, use of layers and blocks exercises on simple drawings.

Introduction to 3d drafting simple exercise on 3d drafting walk through exercises

### **Course Outcomes**

CO1 - Draw the plan, section and elevation of a building.

CO2 - Create, analyze and produce 2D drawings of buildings in AUTO CAD environment.

CO3 - Detailing building plans in CAD environment.

## **CE -319 F SURVEY CAMP AS PER COURSE WORK**

L T P

- - - Sessional: 50 Marks Total:50 marks

### **Course Outcomes**

CO1 - Students will understand the working principles of survey instruments.

CO2 - Student will gain the ability to measure the horizontal distances, difference in elevation, draw and utilize contour plots.

CO3 - Students will calculate angles, distances and levels.

CO4 - Estimate measurement errors and apply corrections.

CO5 - Interpret survey data and compute areas and volumes.

## CE-313 F Design of steel Structures Drawings

L T P  
2-0-3

Sessional -25  
Practical-25  
Total-50

1 Structural Drawings of various types of welded connections (Simple and eccentric)

2. Beam to column connections

3 Column bases – slab bases – gusset base and grillage foundations

4. Plate girders'

5 Roof trusses

6 TENSION MEMBERS AND COMPRESSION MEMBERS.

7 Strut joints, tie joints, purlin joints.

### Course Outcomes

CO1 - Student will understand the study of drawing for various components like connection, trusses.

CO2 – Student will understand the study of drawing for various components like girders, joints etc.

CO3 - Implementation of design in drawing forms with by laws.

### Book Recommended

- 1 Design of steel structures - A.S. Arya & J. I. Ajmani Nem Chand & Bros Roorke
- 2 M Raghupati . TMH Pub New Delhi
- 3 Design of steel structures S M A Kazm S . K Jindal Prentice HALL New Delhi

## CE-317 F Transportation Engineering Lab-I

L T P  
0-0-2

Sessional -25  
Practical-25  
Total-50

- 1.Flakiness and elongation test
- 2 Marshal Stability test
- 3 C B R Valiue test
- 4.Bulk density and Void  
test
- 5 Dorry Abrasion Test
- 6 Specific gravity test
- 7 Solubility Test
- 8 Aggregate Hardness ,Toughness,cementation,adhesiveness test
- 9 Shearing test on soil
- 10 Aggregate Water absorption Test

### Course Outcomes

- CO1 - Student will be able to understand the aggregate properties i.e. hardness, toughness etc.  
CO2 - Bituminous properties useful for pavement design studied and useful for practical application.  
CO3 - Soil characteristics determination for site.

**MAHARSHI DAYANAND UNIVERSITY, ROHTAK**  
**SCHEME OF STUDIES & EXAMINATIONS**  
**B.Tech. 3<sup>rd</sup> YEAR CIVIL ENGINEERING, SEMESTER-**  
**VI Proposed “F” Scheme effective from 2011-12**

Subject Code	Subject Name	L	T	P	Total	Class Marks	Sem Theory Marks	Sem Practical Marks	Total Marks
CE-302-F	Design of Concrete Structures-II	4	2	0	6	50	100	0	150
CE-304-F	Irrigation Engineering-I	3	1	0	4	50	100	0	150
CE-306-F	Geotechnology	3	1	0	4	50	100	0	150
CE-308-F	Sewerage And Sewage Treatment	3	1	0	4	50	100	0	150
CE-310-F	Transportation Engg.-II	3	1	0	4	50	100	0	150
CE-312-F	Engineering Geology	3	1	0	4	50	100	0	150
CE-314-F	Geotechnology Lab	0	0	2	2	25	0	25	50
CE-316-F	Transportation Engg.-II Lab	0	0	2	2	25	0	25	50
CE-318-F	Engineering Geology Lab	0	0	2	2	25	0	25	50
CE-320-F	Environmental Engg. Lab	0	0	2	2	25	0	25	50
GPCE-318-F	General Proficiency	0	0	1	1	0	0	50	50
	Total	19	7	9	35	400	600	150	1150

**NOTE:**

1. Students will be allowed to use non-programmable scientific calculator. However, sharing of Calculator will not be permitted in the examination.
2. Each student has to undergo practical training of 6 weeks during summer vacation and its evaluation shall be carried out in the VII semester.

## CE-302 F DESIGN OF CONCRETE STRUCTURES-11

L T P

4 2 -

Sessional: 50 Marks  
Theory : 100 Marks -  
Total : 150 Marks  
Duration of exam: 3 Hrs.

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

Unit-I: Continuous Beams-Basic assumptions, Moment of inertia, settlements, Modification of moments, maximum moments and shear, beams curved in plan-analysis for torsion, redistribution of moments for single and multi-span beams, design examples.

Unit-II: Flat slabs and staircases-Advantages of flat slabs, general design considerations, approximate direct design method, design of flat slabs, openings in flat slab, design of various types of staircases, design examples.

### SECTION-B

Unit-III: Foundations-Combined footings, raft foundation, design of pile cap and piles, under-reamed piles, design examples.

Unit-IV: Water Tanks, Silos and Bunkers-Estimation of Wind and earthquake forces, design requirements, rectangular and cylindrical underground and overhead tanks, Intze tanks, design considerations, design examples.

Silos and Bunkers-Variou theories, Bunkers with sloping bottoms and with high sidewalls, battery of bunkers, design examples. '

### SECTION-C

Unit-V: Prestressed Concrete-Basic principles, classification of pre-stressed members, various pre-stressing systems, losses in pre-stress, initial and final stress conditions, analysis and design of sections for flexure and shear, load balancing concept, IS Specifications.

End blocks-An lysis of stresses, Magnel's method, Guyon's method, Bursting and spalling stresses, design examples.

Unit-VI: Building Frames-Introduction, Member stiffnesses, Loads, Analysis for vertical and lateral loads, Torsion in buildings, Ductibility of beams, design and detailing for ductility, design examples.

### SECTION-D

Unit-VII: Yield Line Theory-Basic assumptions, Methods of analysis, yield line patterns and failure mechanisms, analysis of one way and two way rectangular and non-rectangular slabs, effect of top corner steel in square slabs, design examples.

## Course Outcomes

CO1 - To be able to perform analysis & design of reinforced concrete members and connections

CO2 - To be able to identify and interpret the appropriate relevant industries design code

CO3 - To be able to design various type of foundations

CO4 - To be able to design various type of building frames

### Books Recommended:

1. Plain and Reinforced Concrete, Vol.2, Jai Krishna & O.P.Jain, Nem Chand & Bros.,Roorkee.
- 4 Pre-Stressed Concrete, N.Krishna Raju, TMH Pub.,N.,Delhi.
- 4 Design of Prestressed Concrete Structure^, T.Y.Lin, John Wiley & Sons., N.Delhi.
- 4 Reinforced Concrete-Limit Stage Design, A.K.Jain, Nem Chand & Bros.,Roorkee.
- 4 IS 1343-1980.IS Code of Practice for Pre-stressed Concrete.
- 4 IS 3370-1976(Part 1 to IV), Indian Standard Code of Practice for Liquid Retaining Structures.
- 4 IS 456-2000, Indian Standard of Practice for Plain and Reinforced Concrete.
- 4 IS 1893, 4326 & 13920 Indian Standard Code of Practice for Earthquake Resistant Design of Structures.

## CE-304 -F IRRIGATION ENGINEERING I

L T P

3 1 -

Sessional: 50 Marks

Theory : 100 Marks -

Total : 150 Marks

Duration of exam: 3 Hrs.

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### S E C T I O N - A

U n i t - I : Regulation works: Canal falls-necessity and location, development of falls, design of cistern element, roughening devices, Principal of design of Sarda type fall, design of straight Glacis fall. Off-take alignment, cross-regulator and distributor, head regulators, devices to control silt entry into the off-taking channel and silt ejector, canal escapes, types of escapes.

### SECTION-B

Unit-11: Cross drainage works: Classification and their selection, Fundamentals of hydraulic design aspects of aqueducts, siphon aqueducts, super passage, canal siphon and level crossing, design of transitions.

Unit-III: Diversion canal headworks: Various components and their functions, layout plan, selection of site for diversion headworks, Bligh's creep theory, Khosla's method of independent variables, use of Khosla's curves, various corrections, silt excluders.

\*

### SECTION-C

Unit-IV: Storage Headworks: Types of dams, selection of a site, gravity dam-two dimensional design, forces acting, stability criterion, elementary profile of a dam, cutoffs and drainage galleries, arch dams-constant angle and constant radius arch dam, simple design and sketches, most economical angle, Earth dam, design principles, seepage through earth dams, seepage line, control of seepage, design of filters.

### SECTION-D

Unit-V: Spillways and Energy Dissipations: Essential requirements of spillway and spillway's capacity, types of spillways and their suitability, Ogee spillways, chute, side channel, shaft and siphon spillways, energy dissipation below spillways, stilling basins, USBR and I.S. Stilling Basins.

## **Course Outcomes**

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

- CO1 - Plan an Irrigation System.
- CO2 - Design irrigation canals and canal network.
- CO3 - Plan and design diversion head works.
- CO4 - Design irrigation canal structures.
- CO5 - Analyze gravity and earth dams.

## **Books Recommended:**

1. Irrigation, Water Resources and Water Power Engineering by P.N.Modi.
2. Fundamentals on Irrigation Engineering by Bharat Singh.
3. Irrigation Engineering and Hydraulic Structures by S.K.Garg.
4. Theory and Design of Irrigation Structures Vol.1 &- II by R.S.Varshney, Gupta & Gupta.

## CE-306 F GEOTECHNOLOGY

L T P

3 1 -

Sessional: 50 Marks

Duration of exam: 3 Hrs.

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

#### Unit-I: Stability of slopes

Causes of failure, factors of safety, stability analysis of slopes-total stress analysis, effective stress analysis, stability of infinite slopes types of failures of finite slopes, analysis of finite slopes-mass procedure, method of slices, effect of pore pressure, Fellenius method to locate centre of most critical slip circle, friction circle method, Taylor's stability number, slope stability of earth dam during steady seepage, during sudden draw down and during and at the end of construction.

### SECTION-B

#### Unit-II Braced Cuts

Depth of unsupported vertical cut, sheeting and bracing for deep excavation, movements associated with sheeting, and bracing, modes of failure of braced cuts, pressure distribution behind sheeting.

#### Unit-III : Cofferdams

Introduction, types of cofferdams, design and lateral stability of braced cofferdams, design data for Cellular cofferdams, stability analysis of cellular cofferdams on soil and rock, inter-lock stresses.

### SECTION-C

#### Unit-IV: Cantilever Sheet Piles

Purpose of sheet piles, cantilever sheet piles, depth of embedment in granular soils-rigorous method Simplified procedure, cantilever sheet pile, penetrating clay, limiting height of wall.

#### Unit-V- Anchored Bulkheads

Methods of design, free earth support method in cohesionless and cohesive soils, fixed earth support method in cohesionless soils-Slum's equivalent beam method.

### SECTION-D

#### Unit-VI: Soil Stabilization

## **Course Outcomes**

CO1 - Students would be able to understand the different causes of slope failure, able to design the problems related to slope stability using different theories.

CO2 - Students will understand the concepts of bracings, coffer dams, they would be able to design coffer dams for stability analysis.

CO3 - Students would be able to understand design the depth of sheet piles under different conditions, also the anchored and cantilever sheet pile can be differentiate on the basis of embedded depth requirement.

CO4 - Students will get familiar with soil stabilization and basics of machine foundations. They would be able to use specific type of stabilization in the field and understand the terminology of machine foundation.

Soil improvement, shallow compaction, mechanical treatment, use of admixtures, lime stabilization  
cement stabilization, lime fly ash stabilization, dynamic compaction and consolidation, Bituminous  
stabilization, chemical stabilization, pre-compression, lime pile and column, stone column, grouting  
reinforced earth. .

#### Unit-VII: Basics of Machine Foundations

Terminology, characteristics elements of a vibratory systems, analysis of vibratory motions of a single degree freedom system-undamped free vibrations, undamped forced vibrations, criteria for satisfactory action of a machine foundation, degrees of a freedom of a block foundation, Barken's soil spring constant, Barken's method of a determining natural frequency of a block foundation subjected to vertical oscillations.

#### **Books Recommended:**

1. Analysis and Design of Sub Structures by Swami Saran, IBH Oxford
2. Basic and Applied Soil Mechanics by Gopal Ranjan and ASR Rao, Newage Int.Pub.
3. Soil Dynamic by Shamsheer Prakash, McGraw H i l l
4. Foundation Design by Teng, Prentice Hall
5. Soil Mechanics & Foundation Engineering by Bharat Singh, Shamsheer Prakash, Nem Chand & Bros, Roorkee.
6. Analysis and Design of Foundation and Retaining Structure by S.Prakash, Gopal Ranjan S.Saran, Sarita Prakashan.

## CE-308F-SEWAGE AND TREATMENT

L T P

3 1 -

Sessional: 50 Marks

Theory : 100 Marks -

Total : 150 Marks

Duration of exam: 3 Hrs.

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

#### Unit-I: 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.**

**Unit –II Sewage collection from houses and buildings, general principal for design of a sanitary plumbing system, Traps function and types, System of plumbing, testing of house sewer, sanitary fittings and other accessories, ventilation of house drainage, waste water recycling in building**

### SECTION-B

#### Unit – III

Quality parameters- BOD, COD, Solids, D.O., Oil & Grease, tests on quality parameters, Sewage disposal , type relative advantage and disadvantage of various sewage disposal system Indian, Standards for disposal effluents into inland surface sources and on land. Bangalore method and Indore method of sewage disposal. Disposal of sewage by dilution - self-purification of streams. Sewage disposal by irrigation (Sewage treatment).

#### Unit IV

Digestion and disposal of primary and secondary sludge – Moisture content, sludge digestion process,, Factors affecting, sludge digestion tanks, disposal of digested sludge

### SECTION-C

#### Unit-V: Sewage Treatment

Objectives of sewage Treatment, classification of treatment process, Preliminary treatment - screening and grit removal units. Skimming tanks, Theory and design aspects of sedimentation, coagulation, merit and demerits of coagulation

Secondary treatment- Biological Filtration – Trickling Filter, High rate Trickling Filter advantage and disadvantages, miscellaneous type of filter, Humus tank, activated sludge process & its modifications, aeration tanks, secondary sedimentation tanks

## Unit VI

Stabilization pond, oxidation pond, Oxidation ditches, aeration lagoons, anaerobic stabilization units -, septic tank and Inhoff tank. Sludge Digestion UASB process sequence and efficiencies of conventional treatment units, Process Design of a complete sewage treatment plant, Examples

### SECTION-D

## Unit VII

Noise Pollution- Definition and introduction, Effect of Noise, characteristics of sound and it's measurement, level of noise , noise rating system and standards, source of noise their levels and controls

## Unit VIII

Air pollution –Definition of air pollution, Effects of air pollution, Dispersion of air pollution in atmosphere, Dispersion models and equations, Air pollution controls.

### **Course Outcomes**

CO1 - Have a knowledge about importance of sanitation and system of sewerage

CO2 - Have a knowledge about various quality parameters

CO3 - Have a knowledge about various sewage treatment techniques

CO4 - Have a knowledge about noise pollution

CO5 - Have a knowledge about air pollution

### Books Recommended:

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

## CE-310 F TRANSPORTATION ENGINEERING II

L T P

3 1 -

Sessional: 50 Marks

Theory : 100 Marks -

Total : 150 Marks

Duration of exam: 3 Hrs.

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

#### **UNIT-I-Design of Flexible Pavements**

Types of pavements. Flexible and rigid pavements. Components of a pavement and their functions. Factors affecting design of pavements. Design of thickness of a flexible pavement by Group Index method, CBR method (including latest IRC guidelines), Triaxial method and Burmister's method.

#### **Unit-II Design of Rigid Pavements**

Westergaard's theory, critical locations of loading, load and temperature stresses. Critical combination of stresses. IRC guidelines for determination of thickness of a rigid pavement.

Joints: requirements, types, patterns. Spacing of expansion and contraction joints. Functions of dowel and tie bars.

### SECTION-B

#### **Unit-III-Highway Construction: Non-Bituminous Pavements**

Brief introduction to earthwork machinery: shovel, hoe, clamshell, dragline, bulldozers. Principles of field compaction of subgrade. Compacting equipments. Granular roads. Construction steps of WBM. WMM. Construction of cement concrete pavements, Slip-form pavers, Basic concepts of the following: soil stabilized roads, use of geo-synthetics, reinforced cement concrete pavements, prestress concrete pavements, roller compacted concrete pavements and fibre reinforced concrete pavements.

#### **Unit-IV Construction of Bituminous Pavements**

Various types of bituminous constructions. Prime coat, tack coat, seal coat and surface dressing. Construction of BUSG, Premix carpet, BM, DBM and AC. Brief coverage of machinery for construction of bituminous roads: bitumen boiler, sprayer, pressure distributor, hot-mix plant, cold-

mix plant, tipper trucks, mechanical paver or finisher, rollers. Mastic asphalt. Introduction to various IRC and MOST specifications.

## SECTION-C

### **Unit-V Highway Maintenance**

Pavement failures. Maintenance operations. Maintenance of WBM, bituminous surfaces and cement concrete pavements. Pavement evaluation. Benkleman beam. Introduction to various types of overlays.

### **Unit-VI Highway Drainage and Hill Roads**

Surface drainage: types, brief design. Types of sub-surface drainage. Special characteristics of hill roads: geometrics, hair pin bends, construction of hill roads, drainage of hill roads, maintenance problems of hill roads.

## SECTION-D

### **Unit-VII Highway Economics and Finance**

Need of economic evaluation. Highway user benefits and costs. Methods of economic evaluation: benefit cost ratio method, net present value method, internal rate of return method, comparison. Highway finance.

### **Unit-VIII-Tunnels**

Sections of tunnels: advantages, limitations and suitability of each section. Shaft. Pilot tunnel. Driving tunnel in rocks: sequence of construction operations, full-face method, heading and bench method, drift method. Driving tunnels in soft ground: sequence of construction operations, needle beam method, shield tunneling, compressed air tunneling.

### **Course Outcomes**

CO1 - Students would be able to understand the different type of pavements able to design various pavements using different theories.

CO2 - Students will understand the concepts of western Gard theory, they would be able to design various roads.

CO3 - Students would be able to understand how to maintain highway and various type overlay and maintained hill road.

CO4 - Students will get familiar with need of economic evaluation.

CO5 - Student will get familiar with tunnels there uses

### Books Recommended:

3. Highway Engg by S.K.Khanna & C.E.G. Justo, Nem Chand Bros., Roorkee.

4. Principles and Practice of Highway Engg. by L.R.Kadiyali, Khanna Publishers, Delhi.

5. Principles of Pavement Design by Yoder,E.J & Witczak,M.W., John Wiley and Sons, USA.

6. Tunnel Engineering by S.C.Saxena, Dhanpat Rai Publications, N.Delhi.

7. A text book of Tunnel, Bridges and Railway Engg. by S.P.Bindra, Dhanpat Rai Delhi.

## CE-312 F ENGINEERING GEOLOGY

L T P

3 1 -

Sessional: 50 Marks

Theory : 100 Marks -

Total : 150 Marks

Duration of exam: 3 Hrs.

Note: Examiner will set 9 questions in total, two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answers type. Each question carries equal marks (20 marks). Students have to attempt 5 questions in total at least one question from each section.

### SECTION-A

Unit-I: Introduction: Definition, object, scope and sub division of geology, geology around us. The interior of the earth. Importance of geology in Civil Engineering projects.

Unit-II: Physical Geology: The external and internal geological forces causing changes, weathering and erosion of the surface of the earth. Geological work of ice, water and winds. Soil profile and its importance. Earthquakes and volcanoes.

### SECTION-B

Unit-III: Mineralogy and Petrology: Definition and mineral and rocks. Classification of important rock forming minerals, simple description based on physical properties of minerals.

Rocks of earth surface, classification of rocks. Mineral composition, Textures, structure and origin of Igneous, Sedimentary and Metamorphic rocks. Aims and principles of stratigraphy. Standard geological/ stratigraphical time scale with its sub division and a short description based on engineering uses of formation of India.

Unit-IV: Structural Geology: Forms and structures of rocks. Bedding plane and outcrops, Dip and Strike. Elementary ideas about fold, fault, joint and unconformity and recognition on outcrops. Importance of geological structures in Civil Engineering projects.

### SECTION-C

Unit-V: Ground water geology- Hydrogeology, aquifers, water table, springs and Artesian well, aquifers, ground water in engineering projects. Artificial recharge of ground water, Elementary ideas of geological investigations. Remote sensing techniques for geological and hydrological survey and investigation. Uses of geological maps and interpretation of data, geological reports.

### SECTION-D

Unit-VI: Applied geology-Physio graphic division in India, Suitability and stability of foundation sites and abutments. Geological conditions and their influence on the selection, location, type and design of dams, reservoirs, tunnels, highways, bridges etc.

Unit-VII: Landslides and Hillslope stability. Improvement of foundation rocks, precaution and treatment against faults, joints and ground water, retaining walls and other precautions. Geology and environment of earth.

### **Course Outcomes**

CO1 - Students would be aware of geology and its scope further the work done by agencies such as wind water and ice

CO2 - Students would be able to understand about rocks and identify them

CO3 - To inherit knowledge of groundwater and aquifers and geological maps

CO4 - To inherit knowledge on Dams, Tunnels, landslides , Earthquakes and volcanoes

### Books Recommende

1 A Text Book of Geology by P.K.Mukherjee

6. Physical and General Geology by S.K.Garg

3 Engineering and General Geology by Prabin Singh4 Introduction of Physical Geology by A.Holmes.

## CE-314 F GEOTECHNOLOGY LAB

L T P

- - 2

Sessional: 25 Marks

Exam : 25 Marks -

Duration of exam: 3 Hrs.

### **List of Experiments:**

1. Grain Size Analysis-Hydrometer method.
2. Shrinkage- Limit Determination.
3. Relative Density of Granular Soils.
4. Consolidated Drained (CD) Triaxial Test.
5. Consolidated Undrained (CU) Triaxial Test with Pore Water Pressure Measurement.
6. Consolidation Test.
7. Undisturbed Sampling.
8. Standard Penetration Test.
9. Dynamic Cone Penetration Test.
10. Models Plate-Load Test.

### **Course Outcomes**

- CO1 - Students would be able to understand to determine consistency limits and relative density of soil.
- CO2 - Students will be familiar with soil investigation and different stages of consolidation.
- CO3 - Students will be able to take different types of samples for soil investigations.
- CO4 - Students could be able to proceed for laboratory as well as field tests for soil investigation.

### **Books Recommended:**

1. Soil Testing for Engineers by S.Prakash & P.K.Jain, Nern Chand & Bros.,Roorkee.
2. Engineering Soil Testing by Lambi, Wiley-Eastern.
3. Engineering Properties of Soils & Their Measurement by JE Bowles, McGraw Hill.
4. Soil Engineering in Theory & Practice by Alam Singh, Vol.11, Geotechnical Testing & Instrumentation, CBS Pub.

## CE-316 F TRANSPORTATION ENGINEERING II LAB

L T P

- - 2

Sessional: 25 Marks

Exam : 25 Marks -

Total : 50 Marks

Duration of exam: 3 Hrs.

### List of Experiments:

1. Aggregate Impact Test.
2. Los-Angeles Abrasion Test on Aggregates.
3. Dorry's Abrasion Test on Aggregates.
4. Deval Attrition Test on Aggregates.
5. Crushing Strength Test on Aggregates.
6. Penetration Test on Bitumen.
7. Ductility Test on Bitumen.
8. Viscosity Test on Bituminous Material
9. Softening Point Test on Bitumen.
10. Flash and Fire Point Test on Bitumen.

### **Course Outcomes:**

CO1 - Student will be able to understand the aggregate properties i.e. hardness, toughness etc with the help of various abrasion test.

CO2 – Student will be able to understand Bituminous properties useful for pavement design

CO3 - Student will be able to understand the useful practical application for Bituminous properties.

## CE 318 F ENGINEERING GEOLOGY LAB

L T P

- - 2

Sessional: 25 Marks

Exam : 25 Marks -

Total : 50 Marks

Duration of exam: 3 Hrs.

### List of Experiments

7. Study of Physical properties of minerals
8. Identification of rocks forming silicate and ore minerals
9. Recognition of rocks
10. Use of clinometers compass and Brunton compass for measurement dip and strike of formations.
11. Geological cross sections and study of geological maps.
12. Study of models of geological structures and outcrops patterns of different types of rocks and land forms

### **Course Outcomes**

CO1 - Students would be aware of physical properties of rocks

CO2 - Students would be able to identify rocks forming silicates and ore minerals

CO3 - Students would be able to recognize various types of rocks

CO4 - Students would be able to use clinometers and compasses

CO5 - Students would be able to read geological maps and develop learnings on various outcrops of types of rocks and landforms

## CE -312 F Environmental Engg Lab

L T P

- - 2

Sessional: 25 Marks

Exam : 25 Marks -

Total : 50 Marks

Duration of exam: 3 Hrs.

### List of experiments

2. Based on course work corresponding to Environmental Engineering
3. Sampling and analysis of water test like hardness, chloride, sulphate phosphate, D.O, PH, connectivity
  - o Sampling and analysis of waste water Like D.O ,B.O.D ,C.O.D, Suspended solid
8. Measurement of noise level
9. Total suspended particulate matters
10. Sulphation rate in water samples
11. Fluoride measurement in water samples
12. High volume and handy samplers

### **Course Outcomes:**

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

CO1 - Quantify the pollutant concentration in water, wastewater and ambient air.

CO2 - Recommend the degree of treatment required for the water and wastewater.

CO3 - Analyze the survival conditions for the microorganism and its growth rate.

**MAHARSHI DAYANAND UNIVERSITY, ROHTAK**

**SCHEME OF STUDIES & EXAMINATIONS**

**B. Tech. 4<sup>th</sup> YEAR CIVIL ENGINEERING, SEMESTER- VII**

**(Scheme-F)**

**EFFECTIVE FROM THE SESSION 2012-13**

Subject Code	Subject Name	Teaching schedule				Marks For class work	Marks for Examination		Total Marks	Duration of Exam
		L	T	P	Total		Theory	Practical		
CE-401-F	Design of Steel Structure-II	3	1	-	4	50	100	-	150	3
CE-403-F	Disaster Mitigation and Management	3	1	-	4	50	100	-	150	4
CE-405-F	Estimating and Costing	3	1	-	4	50	100	-	150	3
CE-407-F	Irrigation Engg-II	3	1	-	4	50	100	-	150	3
-----	Elective	3	1	-	4	50	100	-	150	3
CE-451-F	Hydro Power Engg.	3	1	-	4	50	100	-	150	3
CE-453-F	Ground Water Engg	3	1	0	4	50	100	0	150	3
CE-455-F	Irrigation Drawing Lab	0	0	2	2	50	0	50	100	3
CE-457-F	Practical Training - II	-	-	2	-	-	-	-	-	-
GFCE-459-F	General Fitness for the Profession	-	-	-	-	-	-	50	50	3
	Total	21	7	4	32	400	700	100	1200	

**Note:**

1. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.
2. Student will be permitted to opt for any one elective run by the department. However, the departments will offer only those electives for which they have expertise. The choice of the students for any elective shall not be a binding for the department to offer, if the department does not have expertise.
6. Assessment of Practical Training-II, carried out at the end of VI semester, will be based on seminar, viva-voce and project report of the student. According to performance letter grades A, B, C, F are to be awarded. A student who is awarded 'F' grade is required to repeat Practical Training.

**ELECTIVES**

- 1) CE -409 -F - Energy planning and management
- 2) CE -411-F - Environmental pollution and control
- 3) CE -417- F - Finite Element Methods
- 4) CE- 421 -F - Environmental impact and management
- 5) CE- 423- F - Elements of Earth Quake Engg.
- 6) CE- 433 -F - Hydraulic System Modeling

## CE-401 F DESIGN OF STEEL STRUCTURES-II

**L T P**

**Sessional: 50 Marks**

**3 1**

**Theory : 100 Marks**

**Total : 150 Marks**

**Duration of exam: 3 Hrs.**

### **SECTION A**

Unit-I: Elementary Plastic Analysis and Design: Introduction, Scope of plastic analysis, ultimate load carrying capacity of tension members and compression members, flexural members, shape factor, mechanisms, plastic collapse, analysis, plastic analysis applied to steel beams and simple portal frames and design.

### **SECTION B**

Unit-II: Industrial Buildings: Loads, general arrangement and stability, design considerations, design of purlins, design of roof trusses, industrial building frames, bracings and stepped columns.

Unit-III: Design of Water Tanks: Introduction, permissible stresses, design of circular, rectangular and pressed steel tanks including staging.

### **SECTION C**

Unit-IV: Design of Steel Stacks: Introduction, various loads to be considered for the design of steel stacks, design of steel stacks including foundation.

Unit-V: Towers: Transmission line towers, microwave towers, Design loads, classification, design procedure and specification.

### **SECTION D**

Unit-VI: Cold Formed Sections: Introduction and brief description of various type of cold-formed sections, local buckling, concepts of effective width and effective sections, elements with stiffeners, design of compression and bending elements.

## **Course Outcomes**

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

CO1 - Calculate shape factor and plastic moment capacity.

CO2 - Design water tanks, industrial buildings.

CO3 - Carry out wind load calculations for tall structures and design of steel chimneys.

CO4 - Design light gauge steel sections.

**Books Recommended:**

- 1.Design of Steel Structures, A.S.Arya & J.L.Ajmani, Nem Chand & Bros., Roorkee.
- 2.Design of Steel Structures, P.Dayartnam, Wheeler Pub. Allahabad.
- 3.Design of Steel Structures, Gaylord & Gaylord, McGraw Hill, Newyork/International Students .
- 4.IS:800-1984, Indian Standard Code of Practice for General Construction in Steel.
- 5.IS-801-1975, Indian Standard Code of Practice for Use of cold-formed light gauge steel structural members in general building construction.

## CE- 405 F Estimating and Costing

L T P

Sessional: 50 Marks

3 1 -

Theory : 100 Marks

Total : 150 Marks

Duration of exam : 3 Hrs.

### **SECTION A Estimate:**

Principle of estimation ,units ,item work ,different kinds of estimates, different methods of estimation ,estimation of materials in single room building ,two room building , multi storey buildings, with different sections of walls ,foundation ,floors and roofs ,R.B and R.C.C works ,Plastering ,white washing ,Distempering and painting ,doors and windows ,lump sum items ,Estimates of canals , dams ,barrages,Hilly roads etc.

### **SECTION B Specification of Works:**

Necessity of specification types of specification, general specification, specification of bricks ,cement ,sand ,water, lime, reinforcement: detailed specification for earthwork, cement, concrete ,brickwork, flooring ,D.P.C,R.C.C ,cement plastering ,white and colour washing ,distempering ,painting

### **SECTION C Rate analysis**

Purpose, importance and requirements of rate analysis, units of measurement preparation of rate analysis , procedure of rate analysis for items: Earth work ,concrete works ,R.C.C works ,reinforce brick work ,plastering ,painting ,finishing (white washing ,distempering)

### **SECTION D Public Works Account**

Tender and acceptance of tender ,Ernst money ,security money ,retention money ,measurement book ,cash book, preparation ,examination and payment of bills, first and final bills ,administrative sanction ,technical sanction.Billing – maintenance of muster ROLL, preparation of pay bill ,measurement of work for payment of contractors, different types of payment –first &final ,running advance and final payment ,Valuation Purpose of valuation, principles of valuation depreciation ,sinking fund ,salvage &scrapvalue ,valuation of a building –cost method ,rental –return method .

## **Course Outcomes**

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

CO1 - Prepare quantity estimates for buildings.

CO2 - Calculate the quantity of materials required for civil engineering works as per specifications.

CO3 - Evaluate contracts and tenders in construction practices

CO4 - Prepare cost estimates

## **Books**

6. Dutta BN –Estimating &costing
7. Chakraborty –Estimate costing &specification in civil engg
8. Kohli &kohli –Atext book on estimating &costing (Civil) with drawings Ambala ramesh Publications.
9. Rangwala SC –Estimating &Costing –Anand Charotar Book Stall

## CE-407- F- IRRIGATION ENGINEERING-II- (DESIGN & DRAWING)

L T P

Sessional: 50 Marks

3-1 -0

Exam : 100 Marks

Total : 150Marks

Duration of exam : 3 Hrs.

Complete design and drawing of the following:

### **SECTION A**

1 Design of weirs and barrages on permeable foundation for surface and sub surface flow conditions.

2 Design of Guide Banks.

### **SECTION B**

3 Flood Routing using step by step method.

4 Design of Syphon Aquaduct.

### **SECTION C**

5 Design of Sarda type fall & sloping glacis fall.

6 Seepage line in a homogeneous earth dams on impermeable foundation with horizontal drainage.

### **SECTION D**

7 Design of Ogee Spillway and stilling basin.

8 Design of dams ,aqueducts,symphonic systems & their inlets&outlets ,design of spillways.

Note: Emphasis would be given to the computer aided designs of some of above structures.

## **Course Outcomes**

At the end of the course, students would be able to:

CO1 - Creating Plan an Irrigation System.

CO2 - Creating Plan and design of different structures.

CO3 - Analyzing Design irrigation canal structures.

CO4 - Analyzing gravity and earth dams

## **BOOKS**

3. PunmicBC &PANDE-Irrigation &Water POWER Engineering
4. Sharma .RK –text book of Irrigation Engg &Hydraulics structure
5. Sharma RK-Principles &practices of Irrigation Engg
6. Garg S.K-Irrigation engineering &hydraulics structure –khanna publishers
7. Varshney RS &Gupta –theory &design for Irrigation Structures
8. Swami Sharan –Analysis &Design of substructure .

## CE-423 F ELEMENTS OF EARTHQUAKE ENGINEERING

L T P

Sessional: 50 Marks

3 1 -

Theory : 100 Marks

Total : 150Marks

Duration of exam : 3 Hrs.

### **SECTION A Unit-I: Seismology**

Introduction, plate tectonics, earthquake distribution and mechanism, seismicity, seismic waves, earthquake magnitude and intensity, seismic zoning and seismometry.

#### **Unit-II: Single Degree of Freedom Systems**

Various types of dynamic loads, vibration of single degree of freedom system, Free and forced vibrations, types of damping, critical damping. Transmissibility, vibration measuring instruments, response spectrum.

### **SECTION B Unit-III: Multi-degrees of Freedom (MDOF) Systems**

Equation of Motion, normal modes and natural frequencies, semi-definite systems, dynamic vibration absorbers, vibration dampers, principle of orthogonally, Stodola's method, Holzer's method, matrix method, modal analysis and its limitations. Mode super position method.

### **SECTION C Unit-IV: Seismic Analysis and Design**

General principles, assumptions, seismic coefficient method, response spectrum method, strength and deflection, design criterion for structures, significance of ductility, design and detailing for ductility, code provisions, design examples.

### **SECTION D Unit-V: Seismic Performance, Repair and Strengthening**

Methods for assessing seismic performance, influence of design ductility and masonry infills, criterion for repair and strengthening, repair and strengthening techniques and their applications, additions of new structural elements.

Unit-VI: Vibrational Control

General features of structural control, base isolation, active and passive control system. Earthquake resistance design as per I.S: 1893, I.S: 4326 and I.S: 13920.

### **Course Outcomes:**

CO1 - The students will gain an experience in the implementation of Earthquake Engineering on engineering concepts which are applied in field Structural Engineering.

CO2 - The students will get a diverse knowledge of earthquake engineering practices applied to real life problems.

CO3 - Students will learn to understand the theoretical and practical aspects of earthquake engineering along with the planning and design aspects.

### **Books Recommended:**

7. Elements of Earthquake Engg, Jai Krishna, A.R.Chandershekar & Brajesh Chandra, South Asian Pub N.Delhi.

8. Dynamics of Structures, Clough & Penzion, McGraw Hill

9. Earthquake Engineering, Y-X Hu, S-C.Liu and W.Dong, E and FN Sons., Madras.

10. Earthquake Resistant Concrete Structures, George G.Penelis and A.J.Kapoor, E & FN Sons, Madras

## CE-409 -F - ENERGY PLANNING AND MANAGEMENT

L T P

Sessional: 50 Marks

3 1 -

Theory : 100 Marks

Total : 150 Marks

Duration of exam : 3 Hrs.

### **SECTION A Unit-I: Planning**

Energy scenario of the world in general and India in particular with respect to demand, supply and resources, energy requirement and demand forecasting, isolated and integrated planning, concept of national grid, rural energy planning.

#### **Unit-II: Generation**

Production of energy from conventional and non conventional sources - Hydel, Thermal, Nuclear, Solar, Tidal, wind, M.H.D., Geothermal, Bioconversion etc. Economic feasibility and cost analysis.

### **SECTION B Unit-III: Ecological & Environmental aspects**

Impact assessment of power plants on environment and ecosystem, Environmental degradation & control strategies, Air pollution, water pollution and their control

### **SECTION C Unit-IV: Engineering Aspect**

Load predictions, peak load, base load, load factor, plant factor, capacity factor etc. operation and economics of power stations. Losses in energy generation, transmission and distribution, energy storage and conservation techniques, reliability analysis energy system, energy audit and economics.

### **SECTION D Unit-V: Instrumentation**

Measurement of pressure, flow temperature and humidity, concept of automatic control, power & frequency control, voltage & reactive power control. Microprocessor applications in power systems.

### **Course Outcomes:**

CO1 - Acquiring scientific and technological understanding on the energy and associated environmental issues.

CO2 - Get acquainted with the environmental impacts of energy technologies.

CO3 - Knowing the issues related to climate change, related protocols and modalities as well as procedures for CDM projects.

### **Books Recommended:**

1. Energy Planning & Management by D. Sawyer.

## CE-421 F ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

L T P

Sessional: 50 Marks

3 1 -

Theory : 100 Marks

Total : 150 Marks

Duration of exam : 3 Hrs.

### SECTION A

**Unit I:** Environmental Problems and Issues: Explosion of Environmental issues and scientific, technological and regulatory responses. Effects on ecology, environment, society, health and economy. Review of national and international developments related to environmental issues.

**Unit II:** Review of Remedial Actions: Rural and urban approaches, energy approach, transportation approach, industrial approach, agricultural approach, Technological solutions and Role of technology. Religio-philosophical approaches and concept of Deep ecology. Market based instruments including taxation for pollution control; Role of environmental ethics.

### SECTION B

**Unit III:** Environmental Management, Planning and Economics: Multidisciplinary environmental strategies, planning and decision making, human dimensions. Siting of industries and concept of Zoning Atlas, Economic valuation of environmental assets and preliminary concept of Natural Resource Accounting.

### SECTION C

**Unit IV:** Sustainable development: Concept of limits to growth in terms of population, Food, Resources, Capital, Energy, Land Services etc. Their inter linkages and use of Systems approach including feedback loops. Carrying capacity of systems, prerequisites for sustainable development, concepts of sustainable development in the various sectors of economy such as Industry, Agriculture and Infrastructure.

### SECTION D

**Unit V:** Impact Assessment: Collection of baseline data, concept and methodologies for initial environmental examination (IEE), Environmental Impact Assessment (EIA), Environmental Impact Statement (EIS), Environmental Audit (EA), Risk Assessment (RA) etc. Case studies for the above.

### Course Outcomes:

After attending the course the students would be

CO1 - Acquainted with the environmental management system and its benefits

CO2 - Able to identify and review audit-related documentation, prepare checklists and audit process.

CO3 - Able to apply tools such life cycle assessment, environmental audits, evaluation of environmental performance for environmental decision-making and their impact.

### Books Recommended:

1. Ecology and Environment by P.D.Sharma 2. Environment Management in India by R.K.Sapru.
3. Environmental Quality Management by Bindu N.Lohani 4. Studies in Environment and Development by R.B.Singh. 5. Environmental Impact Assesment by Larry W.Canter. 6. Environmental Planning, Policies and Programmes in India by K.D.Saxena.
7. Concepts in Environmental Impact Analysis by S.K.Shukla & P.R.Shrivastava.

## CE-417 F FINITE ELEMENTS METHODS

L T P

Sessional: 50 Marks

3 1 -

Theory : 100 Marks

Total : 150 Marks

Duration of exam : 3 Hrs.

### **SECTION A Unit-I: General Procedure of Finite Element Methods.**

Basic concept of FEM engineering applications. Comparison of FEM with other methods of analysis. Discretization of the domain basic element shapes. Discretization process. Interpolation polynomials. Selection of the order of the interpolation polynomial. Convergence experiments. Linear interpolation polynomial in terms of global and local coordinates. Formulation of elements characteristics matrices and vector's direct approach. Variation approach. Weighted residual approach. Assembly of elements matrices and vectors and derivation of system equation together with their solution.

### **SECTION B Unit-II: High Order and Iso-Parametric Element Formulations**

Introduction. Higher order one-dimensional element. Higher order elements in terms of natural coordinates and in terms of classical interpolation polynomials. Continuity condition, Numerical integration in one, two and three dimensions.

### **SECTION C Unit-III: Solid And Structural Mechanics**

Introduction. Basic equation of solid mechanics. Static analysis-formulation of equilibrium equations. Analysis of trusses and frames, analysis of plates, analysis of three dimension problems. Analysis of solids of revolution. Dynamic analysis, dynamic equation of motion. Consistent and lumped mass matrices. Constant mass matrices in global coordinate systems. Dynamic response calculation using FEM.

### **SECTION D Unit-IV: Applications and Generalisation of the Finite Element Method**

Energy balance and rate equations of heat transfer. Governing differential equation for the heat conduction in three dimensional bodies. Derivation of finite element equation for one dimensional, two dimensional. Unsteady state and radiation heat transfer problems and their solution. Solution of Helmotz's equation and Reynolds equation. Least squares finite element approach.

### **Course Outcomes:**

CO1 - To obtain an understanding of the fundamental theory of the FEA method.

CO2 - To develop the ability to generate the governing FE equations for systems governed by partial differential equations.

CO3 - To understand the use of the basic finite elements for structural applications using truss, beam, frame, and plane elements.

### **Books Recommended:**

3. The finite element methods in engineering-S.S. Rao, Pub-Pergamon Press
4. Numerical methods in Finite Element Analysis, Klaus-Jurgen Bathe & Edward L Wilson, PHI
5. The Finite Element Methods-O.C. Zienkiewicz, McGraw Hill
6. The Finite Element Methods for Engineers KH Huebner, Wiley, New York

**Note:** In the semester examination, the examiner will set eight questions in all entire syllabus and students will required to attempt only 5 questions.

The use of scientific calculator will be allowed in the examination. However, programmable calculator and

cellular phone will not be allowed.

## CE -411 F Environmental pollution and control

L	T	P	Total
3	1	-	4

Max. Marks : 150 marks

Theory: 100 Marks

Sessional: 50-Marks

Duration: 3 Hours

### SECTION-A

Principles involved in the protection of public health sanitation of dwelling houses, principles of villages and town planning: land pollution and its control. Economics of environments, evaluations, natural resources.

### SECTION-B

Air borne diseases and their control , sources of pollution , occupational health

Environmental management techniques., sensitive analysis, risk assessment.

Water borne diseases, river pollution and control of water pollution

### SECTION-C

Environmental Consideration of ventilation, air conditioning and illumination

Environmental Auditing-general methods, audit process,

### SECTION-D

Sample collection and sampling devices: mathematical modeling Application of above in the design of hospital s and other public buildings

Environmental management system standards-

### Course Outcomes:

CO1 - Ability to distinguish between various methods of air pollution analysis.

CO2 - To understand air pollution sampling and measurement, environmental auditing.

CO3 - Water quality analysis and measurement of soil contamination

### Books:

Environmental management- Vijay Kulkarni-et al.Capital publishing company,N Delhi

Bhatia H.S. Environmental pollution & Control- Galgotia

## CE 455 F Irrigation Drawing (lab)

L T P

SESSIONAL-50

O-o-2

TIME DURATION-3 hrs

1 Drawing of Aqueducts

2 Earthen Dams and Concrete Dams drawings

3 Drawings of Spillways

4. Out let, inlets drawings

5 Culverts

6 Head Regulators

7. Drawings of Barrages and Weirs

8 Drawing of fall

### Course Outcomes

At the end of this course student

CO1 – will be able to draw aqueducts, earthen dams and concrete dams

CO2 – will be able to understand the practical drawing of fall, barrages and weirs.

CO3 – will be able to practically understand drawing of spillways, out let, inlets drawings.

## CE-433 F HYDRAULICS SYSTEM MODELLING

L T P

Sessional: 50 Marks

3 1 -

Theory : 100 Marks

Total : 150 Marks

Duration of exam : 3 Hrs.

### SECTION A

**Unit I:** Development of water resources, demand of water, availability of water, estimation of surface water flow at ungaged site.

Drainage System: Types of drainage systems, Urban drainage system, Agriculture drainage system, Roadways drainage system, Airport drainage system, computer applications.

### SECTION B

**Unit II:** Computation of extreme flow: Concept of probability in hydrology, design flood for hydraulic structure, methods of flood frequency analysis, computation of peak flow from precipitation, measurement of peak discharge.

### SECTION C

**Unit III:** Conveyance System: Methods of conveyance of water, resistance equations for flow, design of rigid boundary channels, design of loose boundary channels. Conduit System: Types of pipes, laying of pipes and joints, forces and stresses in pipe band, pipe line analysis and design, methods of supplying water, storage and distribution reservoir, pipe materials, large conduit design. Hydraulic transient analysis.

### SECTION D

**Unit IV:** Water Distribution System Analysis: Types of pipe network, equivalent pipes, pumps in water distribution system, Network with loops, flow equation, node equation loop equation, numerical solution technique – linear theory method, Newton –Ralphson method. Hardy-Cross method, application of water distribution softwares. Water distribution system models.

### Course Outcomes:

CO1 - Students will be able to understand the concept of drainage system and various conveyance systems which help them to understand the practical problems also.

CO2 - This course will also help to understand the computation of flow and various pipe network systems with their application.

CO3 - Concept of water distribution system with the help of software with different equation also helps them to understand the concepts.

### Books Recommended:

6. Water supply & Sanitary Engg. – V.N.Naziram & S.P.Chandole – Khanna Pub.

7. Hydrology & Hydraulic System –Ram S.Gupta, Printice Hall, New Delhi

8. Fluid Mechanics & Fluid Machinery – S.K.Som & Biswas

## CE- 453 -F GROUND WATER ENGINEERING

L T P

Sessional: 50 Marks

3 1 -

Theory : 100 Marks

Total : 150 Marks

Duration of exam : 3 Hrs.

### SECTION A

**Unit I:** Properties of Aquifers, Formation constants, compressibility of aquifers, Equation of motion for steady and unsteady ground water flow in isotropic homogeneous aquifers, Dupit's assumptions. Unconfined flow with a recharge, tile drain problem. Ground water exploration and methods of investigations.

### SECTION B

**Unit II:** Effect of boundaries, interference of water, leaky aquifers, Thiem's equilibrium formula for unconfined and confined aquifers and determination of hydraulic properties of aquifers. Partial penetration of an aquifer by a well, spherical flow in a well. Non equilibrium formula for aquifer (unsteady radial flows).

### SECTION C

**Unit III:** Tube wells, optimum capacity, silting of tube well, design of tube wells in different aquifers, tube well types, parts, bore hole, strainers, its types, well pipe, casing pipe, blind pipe. Construction and working of tube wells, site selection, drilling operation, cable tool method, hydraulic method, rotary method and drilling fluids, well screen assembly installation, verticality and alignment of tube wells, gravel packing, development of tube wells, sickness, in construction and corrosion and failure of tube wells, Pumping equipment and hydraulic testing of pumps.

### SECTION D

**Unit IV:** Artificial recharge of ground water, considerations and methods, recharge techniques induced infiltration, water spreading, flooding, basins, ditching, modification of natural channels, irrigation, recharge pits, shafts and recharge wells.

### Course Outcomes:

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

CO1 - Identify various types of reservoir and their design aspects.

CO2 - Identify types of aquifers.

CO3 - Carry out surface and subsurface investigation to locate groundwater.

CO4 - Select suitable type of ground water recharge assess systems.

### Books Recommended:

7. Groundwater Hydrology, D.K.Todd, John Wiley & Sons Inc. New York.

8. Groundwater, H.M.Raghunath, Wiley Eastern Ltd., N.Delhi

## CE -403 F DISASTER MITIGATION AND MANAGEMENT

L T P

Sessional: 50 Marks

3 1 -

Theory : 100 Marks

Total : 150 Marks

Duration of exam : 3Hrs.

### SECTION A

Introduction to disaster Control –integrated approach ,role of engineer Hydrological, coastal and marine disaster

Atmospheric Disaster

### SECTION B

Geological mass movement and land disasters

Case studies –Damage profile analysis –  
uttarkashi/Bhuj/IATUR Disaster mitigation

### SECTION C

Forest related disasters

Wind and water driven  
disasters Mining disasters

Major earthquake &causes

### SECTION D

Building codes & other recommended practices cyclones &landslides –causes &remedies

Theoretical concepts &structural behaviour –seismic response of foundation &soil behaviour  
,failure – deformation .

Hazard resistant construction –symmetry eccentric loading ,framed structure,soft floors ,simple configurations

**Books** IS 4326-1993 code of practice for earth quake resistant construction BIS, IS 13920-1993-Ductile detailing of reinforced concrete structure Journal of Indian building Congress Vol IV 1997, Seismic design Handbook – Farzad Naeim, Is 1893 -1984-Criteria for earth quake resistant design for structure , IS 13827-1993 Guidelines for improving earthquake structure , Johri etc disaster Mitigation –Experiences & Reflections.

## **Course Outcomes**

CO1 - Capacity to describe, analyse and evaluate the environmental, social, cultural, economic, legal and organisational aspects influencing vulnerabilities and capacities to face disasters.

CO2 - Capacity to work theoretically and practically in the processes of disaster management.

CO3 - Capacity to obtain, analyse, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios.

## CE-451 F HYDROPOWER ENGINEERING

L T P

Sessional: 50 Marks

3 1 -

Theory : 100 Marks

Total : 150 Marks

Duration of exam : 3 Hrs.

### SECTION-A UNIT-I

INTRODUCTION-Sources of energy, status of hydropower, thermal vs hydropower, advantages of hydropower, place of hydropower in power system

#### UNIT-II

Electrical load on hydro power, load curves, load factor, capacity factors, utility factors, diversity factors, load on hydropower stations, load curves, load duration curves, firm power , secondary power , prediction of loads

### SECTION-B UNIT-III

Types of hydropower stations-classification of hydropower stations, run of river plants, general lay out of run of river plants, Viley dam plans, storage and pondage.Examples

#### UNIT-IV

Basic features of Hydropower plants-advantages of pumps storage plants, storage plants, types of pump storage plants, reversible turbines, efficiency of pump storage plants. Examples.

### SECTION-C UNIT-V

Water Conveyance System-Classifications of penstocks, design criteria of penstocks, anchor blocks, types of valves, water hammer, surges in power channels,Examples Types of Surge shafts-surge analysis, design of surge shafts.Examples.

### SECTION-D UNIT-VI

TURBINES-Types of turbines,criterion for selection,specific speed of turbones,unit powr,unit discharge,cavitatin in turbines, design of draft tube. Examples

#### UNIT-VII

Types of power houses-types of power houses, lay out of power houses, ventilations, under ground power houses, advantages, Examples.

Reference-Water power Engineering by Dandekar and Sharma

Hydropower structures Volume Ili-By R S Varshney

Hydro Power Engineering By Dr Darde P N ,Vayu Education,Delhi

## Course Outcomes

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

CO1 - Estimate the available hydropower in a project.

CO2 - Select suitable types of hydro-power system.

CO3 - Design penstock and anchor blocks.

CO4 - Analyze the different types of loads on power plants.  
CO5 - Planning and design the components of power house.

At the end of each year students will be evaluated on the basis of their performance in various fields. The evaluation will be made by the panel of experts/examiners/teachers to be appointed by the rincipal/Director of the College. A specimen perform indicating the weight age to each component/ activity is given below :-

Name : \_\_\_\_\_ College Roll No. \_\_\_\_\_

Univ.Roll No. \_\_\_\_\_

Branch \_\_\_\_\_ Year of Admission \_\_\_\_\_

**I. Academic Performance (15 Marks) :**

(a) Performance in University Examination :-

Sem.	Result	%age of Marks obtained	Number of Attempt in which the Sem. exam. has been cleared
I			
II			
III			
IV			
V			
VI			
VII			

**II. Extra Curricular Activities (10 Marks) :**

Item	Level of Participation	Remarks (Position Obtained)
Indoor Games (Specify the Games)	_____	_____
Outdoor Games (Specify the Games)	_____	
Essay Competition	_____	
Scientific Technical Exhibitions	_____	
Debate	_____	
Drama	_____	
Dance	_____	

Music \_\_\_\_\_

Fine Arts \_\_\_\_\_  
 \_\_\_\_\_

Painting \_\_\_\_\_  
 \_\_\_\_\_

Hobby Club \_\_\_\_\_  
 \_\_\_\_\_

N.S.S. \_\_\_\_\_  
 \_\_\_\_\_

Hostel Mgt  
 Activities \_\_\_\_\_  
 \_\_\_\_\_

Any other  
 activity (Please  
 Specify) \_\_\_\_\_  
 \_\_\_\_\_

**III. Educational tours/visits/Membership of Professional Societies (5 Marks)**

3 \_\_\_\_\_  
 3 \_\_\_\_\_  
 3 \_\_\_\_\_  
 3 \_\_\_\_\_  
 3 \_\_\_\_\_  
 3 \_\_\_\_\_

**IV. Contribution in NSS Social Welfare Floor Relief/draught relief/Adult Literacy mission/Literacy Mission/Blood Donation/Any other Social Service (5 Marks)**

4 \_\_\_\_\_  
 4 \_\_\_\_\_  
 4 \_\_\_\_\_  
 4 \_\_\_\_\_  
 4 \_\_\_\_\_  
 4 \_\_\_\_\_

**V. Briefly evaluate your academic & other performance & achievements in the Institution (5 Marks)**

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**VI. Performance in Viva voce before the committee (10 Marks)**

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

\*Marks obtained 1.( )+II( )+III( )+IV( )+V( )+VI( ) =

\*\*Total Marks :

Member

Member

Member

Member

Member

## **Course Outcomes**

CO1 - Student will be try to perform well not only for academic performance.

CO2 – Student will be able to participate in activities like games and other extracurricular activities

CO3 – Student will be able to write technical paper, presentation and participate in competitions.

**MAHARSHI DAYANAND UNIVERSITY, ROHTAK**  
**SCHEME OF STUDIES & EXAMINATIONS**  
**B.Tech. 4<sup>th</sup> YEAR CIVIL ENGINEERING, SEMESTER- VIII**  
**(Scheme-F)**

**EFFECTIVE FROM THE SESSION 2012-13**

		<b>Subject</b>	<b>Internal Marks</b>	<b>External Marks</b>	<b>Total Marks</b>
1	<b>CE- 402-F</b>	Industrial Training/Institutional Project Work	150	150	300

**Note:**

The students are required to undergo Industrial Training in State/Central PWD, Railways and other Originations or Institutional Project Work of duration not less than 4 months in a reputed organization or concerned institute. The students who wish to undergo industrial training, the industry chosen for undergoing the training should be at least a private limited company. The students shall submit and present the mid-term progress report at the Institute. The presentation will be attended by a committee. Alternately, the teacher may visit the Industry to get the feedback of the students.

The final viva-voce of the Industrial Training or Institutional Project Work will be conducted by an external examiner and one internal examiner appointed by the Institute. External examiner will be from the panel of examiners submitted by the concerned institute approved by the Board of Studies in Engg. & Technology. Assessment of Industrial Training or Institutional Project Work will be based on seminar, viva-voce, report and certificate of Industrial Training or Institutional Project Work obtained by the student from the industry or Institute.

**The internal marks distributions for the students who have undergone Industrial Training consist of 50 marks from the industry concern and 100 marks by the committee members consisting of faculty members of concerned department of the parent institute.**

The teachers engaged for Institutional Project work shall have a workload of 2 hours per group (at least 4 students) per

week.

## **Course Outcomes**

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

- CO1 - Work in a team to select a problem for project work.
- CO2 - Review and evaluate the available literature on the chosen problem.
- CO3 - Formulate the methodology to solve the identified problem.
- CO4 - Apply the principles, tools and techniques to solve the problem.