

**University Institute of Technology (UIT)
H. P. University Shimla-05
(NAAC Accredited 'A' Grade University)
Himachal Pradesh**

**Scheme and Syllabus
for
Bachelor of Technology
(Civil Engineering)**

(III & IV-SEM)

Effective for batch 2019-2020 and onwards

**B. Tech. (Civil Engineering) Second Year
Semester III**

SN	Cat.	Code	Course Title	Hours /week			Credits	Marks	
				L	T	P	C	Ext.	Int.
1	ESC	ES-3001	Engineering Mechanics	3	1	0	3	100	50
2	ESC	ES-3002	Numerical Methods	3	1	0	3	100	50
3	PCC	CE-3001	Introduction to Fluid Mechanics	3	1	0	3	100	50
4	PCC	CE-3002	Determinate Structures	3	1	0	3	100	50
5	PCC	CE-3003	Surveying & Geomatics	3	1	0	3	100	50
6	PCC	CE-3004	Computer-aided Civil Engineering Drawing	1	0	2	2	100	50
7	PCC	CE-3051	Surveying & Geomatics Lab	0	0	2	1	50	50
8	PCC	CE-3052	Fluid Mechanics Lab	0	0	2	1	50	50
9	ESC	ES-3051	Numerical Method Lab	0	0	2	1	50	50
Total				29			20	1200	

***Vocational Training of 4 weeks after third semester with satisfactory outcome**

Semester IV

SN	Cat.	Code	Course Title	Hours /week			Credits	Marks	
				L	T	P	C	Ext.	Int.
1	HSMC	HSMC-4001	Organisational Behaviour	3	0	0	2	100	50
2	PCC	CE-4001	Water Resource Engineering-I	3	1	0	3	100	50
3	PCC	CE-4002	Indeterminate Structures	3	1	0	3	100	50
4	PCC	CE-4003	Building Materials	3	1	0	3	100	50
5	PCC	CE-4004	Railways and Airports	3	1	0	3	100	50
6	PCC	CE-4005	Building Construction	3	1	0	3	100	50
7	PCC	CE-4051	Structural Lab	0	0	2	1	50	50
8	PCC	CE-4052	Building Material Lab	0	0	2	1	50	50
9	PCC	CE-4053	Construction Lab	0	0	2	1	50	50
Total				29			20	1200	

***Vocational Training of 4 weeks after fourth semester with satisfactory outcome**

- L – No of lectures per week
T – No of tutorials per week
P – No of practical per week
C – Credits
Cat – Course category

Course Category and Definition:

Course Category	Definitions
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management courses
PCC	Professional core courses

SEMESTER-III

Name of the Course	Engineering Mechanics		
Course Code	ES-3001	Credits-3	L-3, T-1, P-0
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Max. Time: 3 hrs
Internal Assessment (based on sessional test (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

INSTRUCTIONS

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION-A

Introduction to Engineering Mechanics covering: Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

SECTION-B

Friction covering: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack.

Basic Structural Analysis covering, Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames & Machines.

SECTION-C

Virtual Work and Energy Method: Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method for equilibrium. Stability of equilibrium.

SECTION-D

Introduction to Kinetics of Rigid Bodies: Basic terms, general principles in dynamics; Types of motion, Instantaneous Centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation; problems including various forces and angles including resultants in various parts of wall crane, roof truss, pipes, etc.; To verify the line of polygon on various forces; to find coefficient of friction between various materials on inclined plan; Free body diagrams various systems including block-pulley.

Text/Reference Books:

1. Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall
2. F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I - Statics, Vol II, – Dynamics, 9th Ed, Tata McGraw Hill
3. R. C. Hibbler (2006), Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
4. Andy Ruina & Rudra Pratap (2011), Introduction to Statics and Dynamics, Oxford University Press
5. Shanes and Rao (2006), Engineering Mechanics, Pearson Education,
6. Hibler and Gupta (2010), Engineering Mechanics (Statics, Dynamics) by Pearson Education
7. Reddy Vijay Kumar K. and K. Suresh Kumar(2010), Singer's Engineering Mechanics
8. Bansal R. K.(2010), A Text Book of Engineering Mechanics, Laxmi Publications
9. Khurmi R. S. (2010), Engineering Mechanics, S. Chand & Co.
10. Tayal A. K. (2010), Engineering Mechanics, Umesh Publications.

Name of the Course	Numerical Methods		
Course Code	ES-3002	Credits: 3	L-3, T-1, P-0
Lectures to be delivered	52 (1 Hr Each) (L = 39, T = 13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 40
Internal Assessment (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		Max. Marks: 50	

INSTRUCTIONS

- For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
- For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section-E. Use of non-programmable calculators is allowed.

Section-A

Solution of algebraic and transcendental equations: Bisection method, method of false position, secant method, Iteration method Newton-Raphson method.

Solution Of Simultaneous Algebraic Equations: Gauss elimination method, Jacobi's method, Gauss-Seidal method.

Section-B

Finite Differences & Interpolation: Forward and Backward difference operators, Newton's Forward and Backward interpolation formulae, Central Difference Interpolation formulae, Gauss's forward and Backward Interpolation formulae, Lagrange's interpolation formulae and Newton's Divided Difference formulae.

Section- C

Numerical Methods To Solve Differential Equations: Solution of first order differential equations using Taylor's Series, Euler's, Picard's and Runge - Kutta method upto 4th order, Predictor- Corrector methods, Simultaneous differential equations of first order, differential equations of second order.

Section- D

Numerical Integration: Numerical integration using Trapezoidal rule, Simpson's 1/3rd and 3/8th rules, Two point and three point Gauss quadrature method.

Books Recommended:

1. Sastry SS, Introductory Methods of Numerical Analysis, Prentice Hall of India
2. Chapra SC and Canale RP, Numerical Methods for Engineers, McGraw Hill Book Company
3. Grewal, BS, "Numerical Methods", Khanna Publishers
4. Computer Oriented Numerical Methods By: V. Rajaraman, PHI Learning Pvt. Ltd.

Name of the Course	Introduction to Fluid Mechanics		
Course Code	CE-3001	Credits-3	L-3, T-1, P-0
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Max. Time: 3 hrs
Internal Assessment (based on sessional test (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

INSTRUCTIONS

- For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
- For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION-A

Basic Concepts and Definitions – Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

SECTION-B

Fluid Statics - Fluid Pressure: Pressure at a point, Pascals law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

SECTION-C

Fluid Kinematics- Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three -dimensional continuity equations in Cartesian coordinates

SECTION-D

Fluid Dynamics- Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation: venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Dimensional Analysis and Dynamic Similitude - Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number; Buckingham's π -Theorem.

Text/Reference Books:

- Fluid Mechanics and Machinery, C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010
- Hydraulics and Fluid Mechanics, P M Modi and S M Seth, Standard Book House
- Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill
- Fluid Mechanics with Engineering Applications, R. L. Daugherty, J. B. Franzini and E. J. Finnemore, International Student Edition, Mc Graw Hill.

Name of the Course	Determinate Structures		
Course Code	CE-3002	Credits-3	L-3, T-1, P-0
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Max. Time: 3 hrs
Internal Assessment (based on sessional test (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

INSTRUCTIONS

- For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
- For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION-A

Introduction: Structure, Loads, Response, and Method of analysis.

Pin jointed Frames: Analysis Using Method of Joints, Method of Section, Graphical Method, and Tension co-efficient Methods.

Cables and Arches: Analysis of Cables, and Three Hinged Arches

SECTION-B

Energy Methods: Strain Energy Due to Axial Force, Bending Moment, Shear Force and Torsion, Principle of Virtual Work, Betti's Law, Castigliano's Theorem I & II, and Dummy Unit Load Method, Application of these Methods to Beams, Frames & Trusses.

SECTION-C

Slope and Deflection in beams: Double integration method, Macaulay's method, Moment area Method, Conjugate beam Method and Strain energy method.

SECTION-D

Rolling/Moving loads and Influence lines diagrams for Determinate structures

Rolling loads, ILD for determinate beams, Gantry girders, Trusses and three hinged Arches.

Text/Reference Books:

- Structural Analysis by R.C. Hibbeler, Pearson.
- Fundamentals of Structural Analysis by K. M. Leet, C. Ming Uan, G & A. M. Gilbert, Tata McGraw Hill Education.
- Structural Analysis by Devdas Menon, Narsoa.
- Theory of Structures Vol-I & II by G. S. Pandit, S. P. Gupta & R. Gupta, Tata McGraw Hill Education.
- Structural Analysis by L.S.Negi & R.S.Jangid, TATA McGraw Hill education.
- Theory of Structures by S. Ramamrutham & R. Narayan, Dhanpat Rai & Son.
- Basic Structural Analysis by C. S. Reddy TATA McGraw Hill education.
- Theory of Structures by B. C. Punmia. Ashok Kumar Jain & Arun Kumar Jain, Laxmi.
- Structural Analysis I & II by S.S.Bhavikatti, Vikas.

Name of the Course	Surveying and Geomatics		
Course Code	CE-3003	Credits-3	L-3, T-1, P-0
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Max. Time: 3 hrs
Internal Assessment (based on sessional test (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

INSTRUCTIONS

- For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
- For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION-A

Basics of surveying: Introduction, concept of Geoids & reference spheroids, coordinate systems, plane & geodetic surveys, methods of location of a point, errors in measurements, surveying instruments, maps, scales and uses, topographic maps, map layout. **Distance measurements:** Direct and indirect methods, chain & tape measurements, Optical methods- tachometers, sub tense bar, Electronic methods- EDMs.

SECTION-B

Measurement of directions: Bearings and angles, compass surveying, magnetic bearings, declination, local attraction errors and adjustments, theodolites- types, uses. **Traversing and Triangulation:** Compass & theodolite traverses- balancing and adjustment of traverses, computation of coordinates, omitted measurements Triangulation- network, strength of figures, selection of stations, inter-visibility, satellite stations, measurements and computations. **Curves:** Elements of simple & compound curves – Method of setting out– Elements of Reverse curve - Transition curve – length of curve – Elements of transition curve - Vertical curves

SECTION-C

Modern Field Survey Systems: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations.

SECTION-D

Photogrammetry Surveying: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereoplotters instruments, mosaics, map substitutes. **Remote Sensing:** Introduction –Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation; digital image processing.

Text/Reference Books:

1. Surveying–Vol 1 & 2 by K. R. Arora.
2. Plane Surveying by A. M. Chandra.
3. Surveying: Principle and Applications by Barry F. Kavanagh.
4. Surveying: Theory and Practice by J.M. Anderson and E.M. Mikhail.
5. Madhu N. Sathikumar, R & S. Gobi, Advanced Surveying: Total Station, GIS & Remote Sensing, Pearson India, 2006.
6. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010
7. Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
8. Anji Reddy, M., Remote sensing and Geographical Information System, B.S. Publications, 2001.
9. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.

Name of the Course	Computer-aided Civil Engineering Drawing		
Course Code	CE-3004	Credits: 2	L-1, T-0, P-2
Lectures to be delivered	39 hours of Lab+Lecture sessions		
Semester End Examination	Max. Time : 3 hrs	Max. Marks : 100	Min. Pass Marks : 40
Internal Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)		Max. Marks: 50	Min. Pass Marks: 25

Introduction: Introduction to concept of drawings, Interpretation of typical drawings, Planning drawings to show information concisely and comprehensively; optimal layout of drawings and Scales; Introduction to computer aided drawing, co- ordinate systems, reference planes. Commands: Initial settings, Drawing aids, Drawing basic entities, Modify commands, Layers, Text and Dimensioning, Blocks. Drawing presentation norms and standards.

Symbols And Sign Conventions: Materials, Architectural, Structural, Electrical and Plumbing symbols. Rebar drawings and structural steel fabrication and connections drawing symbols, welding symbols; dimensioning standards

Masonry Bonds: English Bond and Flemish Bond – Corner wall and Cross walls – One brick wall and one and half brick wall

Building Drawing: Terms, Elements of planning building drawing, Methods of making line drawing and detailed drawing. Site plan, floor plan, elevation and section drawing of small residential buildings. Foundation plan. Roof drainage plans. Depicting joinery, standard fittings & fixtures, finishes. Use of Notes to improve clarity.

Pictorial View: Principles of isometrics and perspective drawing. Perspective view of building. Fundamentals of Building Information Modeling (BIM)

It may be advisable to conduct Theory sessions along with Lab demonstrations.

List of Drawing Experiments:

1. Buildings with load bearing walls including details of doors and windows.
2. Taking standard drawings of a typical two storeyed building including all MEP, joinery, rebars, finishing and other details and writing out a description of the Facility in about 500 -700 words.
RCC framed structures
3. Reinforcement drawings for typical slabs, beams, columns and spread footings.
4. Industrial buildings - North light roof structures – Trusses
5. Perspective view of one and two storey buildings

Text/Reference Books:

1. Subhash C Sharma & Gurucharan Singh (2005), “Civil Engineering Drawing”, Standard Publishers
2. Ajeet Singh (2002), “Working with AUTOCAD 2000 with updates on AUTOCAD 200P”, Tata- Mc Graw-Hill Company Limited, New Delhi
3. Sham Tickoo Swapna D (2009), “AUTOCAD for Engineers and Designers”, Pearson Education,
4. Venugopal (2007), “Engineering Drawing and Graphics +AUTOCAD”, New Age International Pvt. Ltd.,
5. Balagopal and Prabhu (1987), “Building Drawing and Detailing”, Spades publishing KDR building, Calicut,
6. Malik R. S., Meo, G. S. (2009) Civil Engineering Drawing, Computech Publication Ltd New Asian.
7. Sikka, V. B. (2013), A Course in Civil Engineering Drawing, S. K. Kataria & Sons

Name of the Course	Surveying Geomatics Lab		
Course Code	CE-3051	Credits-1	L-0, T-0, P-2
Lectures to be delivered	26 hours of Lab sessions		
Semester End Examination	Max. Time : 3 hrs	Max. Marks : 50	Min. Pass Marks:20
Internal Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)		Max. Marks: 50	Min. Pass Marks:25

List of Experiments

1. To determine the difference in elevation of two given points.
2. Profile levelling and cross sectioning of a given route.
3. To measure the horizontal angle by the method of reiteration and repetition, theodolite traversing and error adjustment.
4. To prepare the contour map of an area by the method of radial lines.
5. Determination of tacheometric constant and determination of height and distance using Stadia tacheometry
6. Plane tabling by the method of radiation and intersection.
7. Solution of Three point problem in plane tabling
8. Setting out of simple circular curve by offsets from long chord and by successive bisection of long chord.
9. Setting out of simple circular curve by radial and perpendicular offsets.
10. Setting out of simple circular curve by one theodolite and by two theodolite method.
11. Topographic survey using total station.

Name of the Course	Fluid Mechanics Lab		
Course Code	CE-3052	Credits-1	L-0, T-0, P-2
Lectures to be delivered	26 hours of Lab sessions		
Semester End Examination	Max. Time : 3 hrs	Max. Marks: 50	Min. Pass Marks : 20
Internal Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)		Max. Marks: 50	Min. Pass Marks: 25

List of Experiments

1. Measurement of viscosity
2. Study of Pressure Measuring Devices
3. Stability of Floating Body
4. Hydrostatics Force on Flat Surfaces/Curved Surfaces
5. Verification of Bernoulli's Theorem
6. Venturimeter
7. Orifice meter
8. Impacts of jets
9. Flow Visualisation -Ideal Flow
10. Length of establishment of flow
11. Velocity distribution in pipes
- 12. Laminar Flow**

Name of the Course	Numerical Method Lab		
Course Code	ES-3051	Credits-1	L-0, T-0, P-2
Lectures to be delivered	26 hours of Lab sessions		
Semester End Examination	Max. Time : 3 hrs	Max. Marks: 50	Min. Pass Marks : 20
Internal Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)		Max. Marks: 50	Min. Pass Marks: 25

List of Experiments:

Write the program in C:-

1. to implement Bisection Method.
2. to implement Newton Raphson Method.
3. to implement Gauss Elimination Method.
4. to implement Jacobi Method.
5. to implement Newton's Forward and Backward interpolation formulae.
6. to implement Runge-Kutta method.
7. to implement Trapezoidal rule.
8. to implement Simpson's $1/3^{\text{rd}}$ rules.
9. to implement Simpson's $3/8^{\text{th}}$ rules.
10. to implement Gauss quadrature method.

Semester-IV

Name of the Course	Organisational Behaviour		
Course Code	HSMC-4001	Credits-2	L-3, T-0, P-0
Lectures to be Delivered	44 (1 Hr Each) (L = 44, T=0 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Max. Time: 3 Hrs
Internal Assessment (based on sessional test (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

INSTRUCTIONS

3. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
4. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION-A

Overview Of Management: Definition - Management - Role of managers - Evolution of Management thought- Organization and the environmental factors – Trends and Challenges of Management in Global Scenario.

Planning: Nature and purpose of planning - Planning process - Types of plans – Objectives - Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision - Decision Making Process - Rational Decision Making

SECTION-B

Organizing: Nature and purpose of organizing - Organization structure - Formal and informal groups Organization - Line and Staff authority - Departmentation - Span of control- Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training - - Performance Appraisal.

SECTION-C

Directing: Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Leadership theories - Communication - Barriers to effective communication - Organization Culture - Elements and types of culture - Managing cultural diversity.

SECTION-D

Controlling: Process of controlling - Types of control - Budgetary and non-budgetary control Q techniques - Managing Productivity - Cost Control - Purchase Control – Maintenance Control - Quality Control - Planning operations.

Text/Reference Books:

1. Organizational Behavior by Robbins, S.P., Prentice Hall of India.
2. Organizational Behavior by Luthans F., McGraw-Hill.
3. Human Behavior at Work: Organizational Behavior by Davis K., Tata McGraw-Hill.

Name of the Course	Water Resource Engineering-I		
Course Code	CE-4001	Credits-3	L-3, T-1, P-0
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Max. Time: 3 Hrs
Internal Assessment (based on sessional test (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

INSTRUCTIONS

- For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
- For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION-A

Introduction: Hydrological cycle, Water budget equation, Watershed, history of hydrology, world water balance, applications in engineering.

Abstractions: Precipitation- Types, Measurement, Computation of average rainfall over a basin, Evaporation, transpiration, infiltration, Φ -index, weather systems.

SECTION-B

Runoff: Factors affecting, runoff computation, rainfall-runoff correlation, flow mass curve, flow duration curve

SECTION-C

Hydrographs: Flood hydrograph, base flow separation, Unit and S-hydrograph, Unit Hydrograph from simple and complex storms, synthetic and instantaneous unit hydrograph.

Groundwater Hydrology: Darcy's Law – concept and applications, Well Hydraulics – Steady and unsteady state.

SECTION-D

Floods: Flood discharge estimation, flood control, reservoir and channel routing.

Text/Reference Books:

- Engineering Hydrology by K. Subramanya,
- Engineering Hydrology by Ojha, Berndtsson and Bhunia,
- Water Resources Engineering by R.K. Linsley and J.B. Franzini, McGraw-Hill Inc, 2000.
- S.K.Sharma by Design of Irrigation Structures,
- Groundwater by H.M Raghunath
- Grounwater Hydrology by B.R. Chahar.

Name of the Course	Indeterminate Structures		
Course Code	CE-4002	Credits-3	L-3, T-1, P-0
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Max. Time: 3 Hrs
Internal Assessment (Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	(based on sessional test (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		Max Marks: 50

INSTRUCTIONS

- For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
- For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION-A

Introduction: Static and kinematic indeterminacy.

Plastic theory – Statically indeterminate structures – Plastic moment of resistance, Plastic modulus, Static and kinematic methods, Upper and lower bound theorems, Plastic analysis of indeterminate beams and frames.

SECTION-B

Statically indeterminate structures: Force methods, Three-moment equation, Method of consistent deformation, Approximate method of analysis (Portal Frame, Cantilever, Substitute Frame Method)

SECTION-C

Kinematically Indeterminate Structures: Displacement Methods- slope deflection method, moment distribution method, Kani's Method.

SECTION-D

Influence lines for In-determinate structures: Muller-Breslau Principle for Influence lines diagram of indeterminate structures: Beams, frame, trusses and two hinged & fixed arches.

Computer Applications in Structural Analysis: Introduction to software and its applications to 2D trusses and building frames.

Text/Reference Books:

- Structural Analysis by R.C. Hibbeler, Pearson.
- Fundamentals of Structural Analysis by K. M. Leet, C. Ming Uan, G&A. M. Gilbert, Tata McGraw Hill Education.
- Structural Analysis by Devdas Menon, Narsoa.
- Theory of Structures Vol-I&II by G. S.Pandit,S. P.Gupta&R.Gupta, Tata McGraw Hill Education.
- Structural Analysis by L. S. Negi &R. S.Jangid, TATA McGraw Hill education.
- Theory of Structures by S. Ramamrutham & R.Narayan, Dhanpat Rai & Son.
- Basic Structural Analysis by C. S. Reddy TATA McGraw Hill education.
- Theory of Structures by B. C. Punmia. Ashok Kumar Jain & Arun Kumar Jain, Laxmi
- Structural Analysis I&II by S. S. Bhavikatti, Vikas.

Name of the Course	Building Materials		
Course Code	CE-4003	Credits-3	L-3, T-1, P-0
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 Hrs
Internal Assessment (based on sessional test (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max Marks: 50		

INSTRUCTIONS

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION-A

Basic Structural Building Materials - Principle properties of Engineering materials: Physical & Mechanical, Clay product – Clay. **Brick and Tiles:** Classification, tiles. Classification, characteristics of good building stone, common building stones in India. **Limes:** Classification and applications.

SECTION-B

Cement: Composition, types, manufacturing of Ordinary Portland Cement, rate of hydration, special types. **Fine and Coarse aggregate:** Source, impurities, Classification and Characteristics.

Timber: Classification, Characteristics of good timber, defects in timber, wood product and its applications, seasoning of timber, tests on timber, plywood,

SECTION-C

Transformed Material - Mortars: Classification, characteristics, functions of ingredient, Cement concrete and Special concrete: Types, physical properties. Plastics and P.V.C.

SECTION-D

Service Material: Ceramic products: classification, refractories, glass, properties of ceramic materials. **Ferrous and non-ferrous Metals and alloys:** Properties, uses. **Paints, Distemper & Varnishing:** Basic constituents, types, composition, defects, application.

Text/Reference Books:

1. R.K. Rajput, S. Chand Publishers.
2. Building Materials by S. K. Duggal, New Age Int. Publishers.
3. Building Materials by P. C.Varghese, PHI.
4. Engineering Materials by Kulkarni, C. J., "A text book of Engineering Materials", Ahmedabad book Depot, Ahmedabad, 1968.
5. Kumar Sushil, "Engineering Materials, "Standard Publishers Distributors, Delhi, 1994.

Name of the Course	Railways and Airports		
Course Code	CE-4004	Credits-3	L-3, T-1, P-0
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 hrs
Internal Assessment (based on sessional test (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)			Max Marks: 50

INSTRUCTIONS

- For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
- For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION-A

Planning of Railways: Significance of Road, Rail, Air and Water transports Coordination of all modes to achieve sustainability, Route alignment surveys, Soil suitability analysis, Railway stations and yards, passenger amenities

SECTION-B

Railway Design: Elements of permanent way Rails, Sleepers, Ballast, rail fixtures and fastenings, Track Stress, coning of wheels, creep in rails, signalling and interlocking, Geometric design of railways, gradient, super elevation, Points and Crossings

SECTION-C

Airport Planning: Air transport characteristics-airport classification-airport planning: objectives, components, layout characteristics, criteria for airport site selection and ICAO stipulations, Typical airport layouts, Parking and circulation area, Airport Zones, Passenger Facilities and Services

SECTION-D

Airport Design: Runway Design: Orientation, Wind Rose Diagram, Runway length, Geometric design of runways, Configuration and Pavement Design Principles, Elements of Taxiway Design, Runway and Taxiway Markings and lighting.

Text/Reference Books:

- “A Course in Railway Engineering” by Saxena Subhash C and Satyapal Arora, Dhanpat Rai and Sons, Delhi, 2003.
- “Airport Planning and Design” by Khanna S K, Arora M G and Jain S S, Nem Chand and Brothers, Roorkee, 2012

Name of the Course	Building Construction		
Course Code	CE-4005	Credits-3	L-3, T-1, P-0
Lectures to be Delivered	52 (1 Hr Each) (L=39, T=13 for each semester)		
Semester End Examination	Max Marks: 100	Min Pass Marks: 40	Maximum Time: 3 Hrs
Internal Assessment (based on sessional test (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max Marks: 50		

INSTRUCTIONS

- For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
- For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION-A

Structural Components of building and building specification: *Foundation:* Type, application, *Masonry:* Stone, Brick and Confined, Types, Bonds, defects. *Walls:* Design Consideration, constructional details, types of load bearing and non-load bearing walls.

SECTION-B

Floor and Roofs: type, Ground/Upper: Flat /Sloped. Beam/Band-Plinth, Sill, Lintel -Types and details Stairs, Ramps - classification, application. *Form work:* Requirements, Load applied, Scaffolding.

SECTION-C

Non Structural Components of building and building specification: *Plastering, Pointing:* Type, methods, defects. *Doors and Windows, Ventilators:* Locations, sizes, types. *Dampness and Water Proofing:* Causes, Prevention Methods, damp-proofing treatment.

SECTION-D

Materials used Building Service: Plumbing- Fitting, Fixture, System, *Termite Proof:* Materials used and Method of application. *Fire Protection:* Fire safety requirement, fire extinguishing equipment. *Thermal Insulation:* Basic definitions, Materials used, methods. *Acoustics & Sound Insulation:* characteristics, sound insulation, acoustical design. *Ventilation:* Functional requirement, Systems

Text/Reference Books:

- Building Construction by B.C.Punmia Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publication.
- Arora, S.P. & Bindra, S.P., 'A text book of Building Construction' Dhanpat Rai & Sons, Delhi, 1977.
- Jha, J. & Sinha, S.K., "Building Construction", Khanna Publishers, Delhi, 1977. Kumar Sushil, " Building construction", Standard Publishers, Distributors, Delhi, 1994.
- McKay W.B., "Building Construction, "Vol.1 to 4, Orient Longman Ltd., Hyderabad, Bombay, Madras, Delhi, Vol.1 & 2 -1995, Vol. 3-1996, Vol. 4-1998.
- Punmia, B.C., "A text book of Building Construction ", Laxmi Publications, Delhi, Madras, 1987.

Name of the Course	Structural Lab		
Course Code	CE-4051	Credits-1	L-0, T-0, P-2
Lectures to be delivered	26 hours of Lab sessions		
Semester End Examination	Max. Time : 3 hrs	Max. Marks : 50	Min. Pass Marks:20
Internal Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)		Max. Marks: 50	Min. Pass Marks:25

List of Experiments

1. To verify the Betti's Law & Maxwell law of reciprocal displacements.
2. Study of a three hinged arch experimentally for a given set of loading and compare with analytical results.
3. To obtain experimental influence line diagram for horizontal thrust in a three hinged arch and compare with theoretical value.
4. To determine the flexural rigidity of a given beam.
5. To study the behaviour of different type of struts.
6. To verify moment area theorem for slopes and deflections of a beams
7. To find the deflection of a pin-connected truss and to verify the results by calculation and graphically.
8. To determine the carry over factors for beam with rigid connections.
9. To determine the rotational stiffness of a beam when far end is (a) fixed (b) pinned.
10. Determine experimentally the horizontal displacement of the roller end of a two hinged arch for a given set of loading and to compare the results with those obtained analytically.
11. To obtain experimental influence line diagram for horizontal thrust in a two hinged arch and compare with theoretical value.
12. To study tensile stress and strain on different materials

Name of the Course	Building Materials Lab		
Course Code	CE-4052	Credits-1	L-0, T-0, P-2
Lectures to be delivered	26 hours of Lab sessions		
Semester End Examination	Max. Time : 3 hrs	Max. Marks:50	Min. Pass Marks: 20
Internal Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)		Max. Marks:50	Min. Pass Marks: 25

List of Experiments

- 1) Test For Cement:
 - i. Fines of Cement - a) Sieve Analysis Air b) Permeability Test
 - ii. Standard Consistency
 - iii. Initial and Final Setting Time
 - iv. Soundness
 - v. Compressive Strength
 - vi. Specific Gravity
- 2) Test for Fine Aggregate:
 - i. Specific Gravity (FA)
 - ii. Bulking of Fine Aggregate
 - iii. Fineness Modulus, gradation.
- 3) Test for Course Aggregate:
 - i. Specific Gravity and Water Absorption
 - ii. Fineness Modulus and Gradation.
- 4) Test for Fresh & Hard Concrete:
 - i. Workability Test
 - a) Compaction Factor Test
 - b) Vee Bee Test
 - ii. Cube and Cylinder Strength of Concrete
 - iii. Flexural Tensile Strength
- 5) Test for Brick & Stone:
 - i. Water Absorption/Efflorescence
 - ii. Compressive Strength

Note: The concerned Course Coordinator will prepare the actual list of experiments/problems at the start of semester based on above generic list.

Name of the Course	Construction Lab		
Course Code	CE-4053	Credits-1	L-0, T-0, P-2
Lectures to be delivered	26 hours of Lab sessions		
Semester End Examination	Max. Time : 3 hrs	Max. Marks:50	Min. Pass Marks: 20
Internal Assessment (based on Lab work 30%, Lab record 30%, Viva 30%, Attendance 10%)		Max. Marks:50	Min. Pass Marks: 25

List of Drawing Sheet

1. Conventional Representation– Drawing size, layout, title block, scales, lettering and dimensioning
2. Conventional Signs and symbols- Alphabetic, Sanitary, Plumbing, Drains and Pipes, Doors, windows
3. Masonry: Brick- Bonds- English, Flemish- $1\frac{1}{2}$ brick, stone-coursed random rubble, Ashlar, Brick Spread Foundations
4. Damp Proof Course: DPC in external/internal wall, basement, cavity wall
5. Floors – Ground floor level with plinth beam / band, Upper Floor - RCC slab on wall, section through a wall
6. Arches and Lintel – Semicircular / Relieving arch, RCC lintel
7. Doors and Windows – Aluminum/Steel paneled glazed door, Glazed window, steel, aluminium section
8. Stairs – Elevation/Plan – Dog legged
9. Plumbing– Single Stack/ two pipe system Sewerage – Manhole, Septic tank , seepage pit
10. Building Plan/ Elevation/section: Residential
11. Building Plan/ Elevation/section: Residential on Drafting software