ADIKAVI NANNAYA UNIVERSITY

RAJAMAHENDRAVARAM

Board of Studies

University College of Engineering

BTECH CIVIL ENGINEERING SYLLABUS
II YEAR ONWARDS (For A.B. 2019-20)

Branch/Course: Civil Engineering Semester III (Second year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
BSC-CE301	Probability and Statistics	75	25	100	3	0	0	3
PCC-CE302	Strength of Materials	75	25	100	3	0	0	3
PCC-CE303	Surveying and Geometrics	75	25	100	3	0	0	3
PCC-CE304	Fluid Mechanics	75	25	100	3	0	0	3
PCC-CE305	Building Materials, Construction and Planning	75	25	100	3	0	0	3
LC-CE306	Strength of Materials Lab	50	50	100	0	0	3	1.5
LC-CE307	Surveying Field Work - I	50	50	100	0	0	3	1.5
LC-CE308	Building Planning and Design	50	50	100	0	0	3	1.5
MC-CE309	Essence of Indian Traditional Knowledge	75	50	100	2	0	0	0
MC-CE310	Skill oriented course	--	50	50	1	0	2	2
	Total Credits							21.5

Note: 2 lab Hrs/Week or 1 Theory Hrs/Week for SKILL DEVELOPMENT COURSE

Course Code &Title: BSC-CE301: PROBABILITY AND STATISTICS **Semester & Year of study: III & 2020-2021** **Course Index: C301**	
Course Objectives: The learning objectives of this course are:	

Course Objectives
The ideas of probability and random variables and various discrete and continuous Probability distributions and their properties.
The basic ideas of statistics including measures of correlation and regression
The statistical methods of studying data samples.
The idea of curve fitting, correlation and regression.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C301.1	Formulate and solve problems involving random variables and apply statistical method for analyzing experimental data
C301.2	Correlate the material of one unit to the material of other unit.
C301.3	Resolve the potential misconceptions and hazards in each topic of study.

BSC-CE301: PROBABILITY AND STATISTICS

Theory: 3Hrs/week   **Credits: 3**
Int Marks: 25   **Ext Marks: 75**

UNIT-I

Probability

Probability spaces, conditional probability, independent events, and Bayes' theorem.
Random variables: Discrete and continuous random variables, Expectation of Random Variables, Variance of random variables

UNIT-II

Probability distributions

Binomial, Poisson, evaluation of statistical parameters for these distributions, Poisson Approximation to the binomial distribution, Continuous random variables and their Properties, distribution functions and density functions, Normal, evaluation of statistical parameters for these distributions.

UNIT-III

Estimation & Tests of Hypotheses

Introduction, Statistical Inference, Classical Methods of Estimation, Estimating the Mean, Standard Error of a Point Estimate, Estimating the Variance, Estimating a Proportional of single mean, Difference between Two Means, between Two Proportions for two Samples Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, Tests Concerning a Single Mean, Tests on Two Means, Test on a Single Proportion, Two Samples: Tests on Two Proportions.

UNIT-IV

Applied Statistics

Curve fitting by the method of least squares- fitting of straight lines, second degree Parabolas and more general curves, Correlation and regression - Rank correlation.

Text Books :

1. A Text Book of Probability and Statistics – Dr.ShanazBathul – Vgs.Book Links

Reference Books:

1.   J.W Brown and R.V Churchil, Complex variables and Applictions , 7th Ed.,MC-GrawHill,2004

2.   Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press

3.   Ronald E. Walpole, Raymond H. Myers,Sharon L. Myers,Keying Ye, Probability & Statistics For Engineers & Scientists, 9th Ed. Pearson Publishers.

Course Code &Title: PCC-CE302 STRENGTH OF MATERIALS
Semester & Year of study: III & 2020-2021
Course Index: C302

Course Objectives:
The learning objectives of this course are:

Course Objectives

The students completing this course are expected to understand the basic terms like stress, strain, poisons ratio… etc. and different stress induced in beams, thin cylinders, thick cylinders and columns. Further the student shall be able to understand the shear stresses in circular shafts.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C302.1	To gain a fundamental understanding of the concepts of stress and strain by analysis of solids and structures.
C302.2	To study engineering properties of materials, force-deformation, and stress-strain relationship.
C302.3	To learn fundamental principles of equilibrium, compatibility, and force-deformation relationship, and principle of superposition in linear solids and structures.
C302.4	To analyze determinate and indeterminate axial members, torsional members, and beams to determine axial forces, torque, shear forces, and bending moments.

PCC-CE302: STRENGTH OF MATERIALS

Theory: 3Hrs/week   **Credits: 3**
Int. Marks: 25   **Ext. Marks: 75**

UNIT – I

SIMPLE STRESSES & STRAINS: Elasticity and plasticity – Types of stresses & strains– Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Bars of varying section – composite bars – Temperature stresses. Principal planes and principal stresses – Concept o f Mohr's circle limited to simple problems only.

UNIT – II

SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

FLEXURAL STRESSES: Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T sections – Design of simple beam sections.

SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T sections.

UNIT – IV

THIN CYLINDERS: Thin cylindrical vessels subjected to internal pressure, longitudinal and circumferential stresses & strains, Volumetric strains – changes in dimensions of thin cylinders – Thin spherical shells.

THICKCYLINDERS – Stresses in a thick cylindrical shell, lame's equation – cylinders subjected to inside & outside pressures – stresses in compound thick cylinders.

TEXT BOOKS:
1. Strength of materials by R.K.Bansal ,Laxmi Publications.
2. Strength of materials by Bhavikatti, Lakshmipublications.
3. Strength of materials by RK Rajput, S Chand publications.

REFERENCES: 1.Strength of Materials by S.Timshenko

Course Code &Title: PCC-CE303 SURVEYING AND GEOMETRICS'
Course Code &Title: PCC-CE303 SURVEYING AND GEOMETRICS' **Semester & Year of study: III & 2020-2021** **Course Index: C303**
Course Objectives: The learning objectives of this course are:

Course Objectives
Know the principle and methods of surveying.
Measure horizontal and vertical- distances and angles
Recording of observation accurately
Perform calculations based on the observation
Identification of source of errors and rectification methods
Apply surveying principles to determine areas and volumes and setting out curves

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C303.1	Apply the knowledge to calculate angles, distances and levels
C303.2	Identify data collection methods and prepare field notes
C303.3	Understand the working principles of survey instruments, measurement errors and corrective measures
C303.4	Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies

PCC-CE303: SURVEYING AND GEOMETRICS'

Theory: 3Hrs/week   **Credits: 3**
Int Marks: 25   **Ext Marks: 75**

UNIT - I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, surveying accessories. Introduction to Compass, leveling and Plane table surveying.
Measurement of Distances and Directions
Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections.
Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip – W.C.B systems and Q.B. system of locating bearings.

UNIT - II

Leveling- Types of levels, temporary and permanent adjustments, methods of leveling, booking and Determination of levels, Effect of Curvature of Earth and Refraction.
Contouring- Characteristics and uses of Contours, methods of contour surveying.
Areas - Determination of areas consisting of irregular boundary and regular boundary.
Volumes -Determination of volume of earth work in cutting and embankments for level section, volume of borrow pits, capacity of reservoirs.

UNIT - III

Theodolite Surveying: Types of Theodolites, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrically leveling when base is accessible and inaccessible.
Traversing: Methods of traversing, traverse computations and adjustments, Introduction to Omitted measurements.

UNIT - IV

Curves: Types of curves and their necessity, elements of simple, compound, reverse curves.
Tachometric Surveying: Principles of Tachometry, stadia and tangential methods of Tacheometry,
Modern Surveying Methods: Principle and types of E.D.M. Instruments, Total station- advantages and Applications. Introduction to Global Positioning System.

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 stereo plotting instruments, mosaics, map substitutes.

TEXT BOOKS:
1. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.
2. Chandra A M, "Plane Surveying and Higher Surveying", , New Delhi.
3. Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

REFERENCES:
1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill.
2. Surveying and Levelling by R. Subramanian,
3. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi.

Course Code &Title: PCC-CE304 FLUID MECHANICS
Semester & Year of study: III & 2020-2021
Course Index: C304

Course Objectives:
The learning objectives of this course are:

Course Objectives
To understand the properties of fluids and fluid statics.
To derive the equation of conservation of mass and its application.
To solve kinematic problems such as finding particle paths and streamlines.
To use important concepts of continuity equation, Bernoulli's equation and turbulence, and apply the same to problems.
To analyze laminar and turbulent flows.
To understand the various flow measuring devices.
To study in detail about boundary layers theory.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C304.1	Understand the various properties of fluids and their influence on fluid motion and analyse a variety of problems in fluid statics and dynamics.
C304.2	Calculate the forces that act on submerged planes and curves.
C304.3	Ability to analyse various types of fluid flows.
C304.4	Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces.
C304.5	Able Measure the quantities of fluid flowing in pipes, tanks and channels.

PCC-CE304: FLUID MECHANICS

Theory: 3Hrs/week   **Credits: 3**
Int. Marks: 25   **Ext. Marks: 75**

UNIT I

Introduction: Dimensions and units – Physical properties of fluids - specific gravity, viscosity, surface tension, vapour pressure and their influences on fluid motion, pressure at a point, Pascal's law, Hydrostatic law -atmospheric, gauge and vacuum pressures- measurement of pressure. Pressure gauges, Manometers: Differential and Micro Manometers.

Hydrostatics: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure.

UNIT – II

Fluid Kinematics: Description of fluid flow, Stream line, path line and streak line and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two , three dimensional flows – stream and velocity potential functions, flow net analysis.

Fluid Dynamics: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line - Momentum equation and its application – forces on pipe bend.

UNIT – III

Laminar Flow and Turbulent Flows: Reynold's experiment – Characteristics of Laminar & Turbulent flows, Shear and velocity distributions, Laws of Fluid friction, Hagen-Poiseulle Formula, Flow between parallel plates, Flow through long tubes, hydro dynamically smooth and rough flows.

Closed Conduit Flow: Darcy-Weisbach equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, variation of friction factor with Reynold's number – Moody's Chart, Pipe network problems, Hazen-Williams formula, Hard-Cross Method,

UNIT – IV

Measurement of Flow: Pitot tube, Venturi meter and Orifice meter – classification of orifices, small orifice and large orifice, flow over rectangular, triangular, trapezoidal and Stepped notches, Broad crested weirs and Ogee weirs.
Boundary Layer Theory: Boundary layer (BL) – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarman momentum integral equation, laminar and turbulent Boundary layers (no deviations)- BL in transition, separation of BL, Control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

Text Books:
1. Modi P.N and Seth S.M.(2018), "Fluid mechanics", Standard book house, New Delhi
2. AtextofFluidmechanicsandhydraulicmachines,R.K.Bansal-LaxmiPublications (P) ltd., New Delhi

References:
1. K. Subramanyam, Fluid mechanics and hydraulic machines Mc graw hill education, IInd edition
2. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P.N. Chandramouli, Oxford Higher Education.
3. Principle of fluid mechanics and fluid machines III edition, university press

Course Code &Title: PCC-CE305 BUILDING MATERIALS, CONSTRUCTION & PLANNING
Semester & Year of study: IV & 2020-2021
Course Index: C305

Course Objectives:
The learning objectives of this course are:

Course Objectives
Initiating the student with the knowledge of basic building materials and their properties.
Imparting the knowledge of course pattern in masonry construction and flat roofs and techniques of forming foundation, columns, beams, walls, sloped and flat roofs.
The student is to be exposed to the various patterns of floors, walls, different types of paints and varnishes.
Imparting the students with the techniques of formwork and scaffolding.
The students should be exposed to classification of aggregates, moisture content of the aggregate

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C305.1	The student should be able to identify different building materials and their importance in building construction.
C305.2	The student is expected to differentiate brick masonry, stone masonry construction and use of lime and cement in various constructions.
C305.3	The student should have learnt the importance of building components and finishing.
C305.4	The student is expected to know the classification of aggregates, sieve analysis and moisture

PCC-CE305: BUILDING MATERIALS, CONSTRUCTION & PLANNING

Theory: 3Hrs/ Week   **Credits: 3**
Int Marks: 25   **Ext Marks: 75**

UNIT I
Stones, Bricks and Tiles: Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacturing of bricks. Characteristics of good tile - manufacturing methods, types of tiles. Uses of materials like Aluminium, Gypsum, Glass and Bituminous materials

UNIT II
Masonry: Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls. Wood: Structure – Properties- Seasoning of timber- Classification of various types of woods used in buildings- Defects in timber. Alternative materials for wood – Galvanized Iron, Fiber Reinforced Plastics, Steel, Aluminium.

UNIT III
Lime and Cement: Lime: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime.
Cement: Portland cement- Chemical Composition – Hydration, setting and fineness of cement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of cement concrete and their importance – various tests for concrete.

Building Components: Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre fabricated roofs.

UNIT IV
Finishings and Aggregates: Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering. Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. Form Works and Scaffoldings.
Aggregates - Classification of aggregate – Coarse and fine aggregates- particle shape and texture – Bond and Strength of aggregate – Specific gravity – Bulk Density, porosity and absorption – Moisture content of Aggregate- Bulking of sand – Sieve analysis.

Text Books:
1. Building Materials, S. S. Bhavikatti, Vices publications House private ltd.
2. Building Construction, S. S. Bhavikatti, Vices publications House private ltd.
3. Building Materials, B. C. Punmia, Laxmi Publications private ltd.
4. Building Construction, B.C. Punmia, Laxmi Publications (p)ltd.

References:
1. Building Materials, S. K. Duggal, New Age International Publications.
2. Building Materials, P. C. Verghese, PHI learning (P)ltd.
3. Building Materials, M. L. Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
4. Building construction, P. C. Verghese, PHI Learning (P)Ltd.
5. Building Materials, Construction and Planning, S. Mahaboob Basha, Anuradha Publications, Chennai.

Course Code &Title: LC-CE306 STRENGTH OF MATERIALS LAB Semester & Year of study: III & 2020-2021 Course Index: C306
Course Objectives: The learning objectives of this course are:
Course Objectives
To impart practical knowledge on the evaluation of material properties through various destructive testing procedures and their hardness evaluation.
Course Outcomes: By the end of the course, the student will be

Course Index	Course Outcomes
C306.1	To understand evaluation of material properties through various testing procedures.

Lab: 3Hrs/week   **Credits: 1.5**
Int Marks: 50   **Ext Marks: 50**

Experiments
1. Tension test on Mild steel bar
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test (Charpy and Izod impact test)
9. Sheartest (on UTM)
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of Electrical resistance strain gauges
12. Continuous beam – deflection test.

List of Major Equipment:
1. Universal Testing Machine
2. Torsion testing machine
3. Brinnell's / Rock well's hardness testing machine
4. Setup for spring tests
5. Compression testing machine
6. Izod Impact machine
7. Shear testing machine
8. Beam setup for Maxwell's theorem verification.
9. Electrical Resistance gauges

Course Code &Title: LC-CE307 SURVEYING FIELD WORK-I
Semester & Year of study: III & 2020-2021
Course Index: C307

Course Objectives:
The learning objectives of this course are:

Course Objectives
The Lab sessions would include experiments on Chain Surveying Chain Traverse Compass Surveying Compass surveying Traversion Plane Table Surveying – Radiation, intersection, Traverse, Resection Leveling

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C307.1	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 apply the procedures involved in field work and to work as a surveying team plan a survey appropriately with the skill to understand the surroundings take accurate measurements, field booking, plotting and adjustment of errors can be understood plot traverses / sides of building and determine the location of points present on field on a piece of paper .

LC-CE307: SURVEYING FIELD WORK-I

Lab: 3Hrs/week   **Credits: 1.5**
Int Marks: 50   **Ext Marks: 50**

List of Field Works:

1.   Survey by chain survey of road profile with offsets in case of road widening.

2.   Survey in an area by chain survey (Closed circuit)

3.   Determination of distance between two inaccessible points by using compass.

4.   Finding the area of the given boundary using compass (Closed Traverse)

5.   Plane table survey; finding the area of a given boundary by the method of Radiation

6.   Plane table survey; finding the area of a given boundary by the method of intersection.

7.   Two Point Problem by the plane table survey.

8.   Fly levelling : Height of the instrument method (differential levelling)

9.   Fly levelling: rise and fall method.

10. Fly levelling: closed circuit/ open circuit.

11. Fly levelling; Longitudinal Section and Cross sections of a given road profile.

12. Fly levelling and Fly chaining (complete field work).

Note: Any 10 field work assignments must be completed.

Course Code &Title: LC-CE308 BUILDING PLANNING AND DESIGN Semester & Year of study: IV & 2020-2021 Course Index: C308
Course Objectives: The learning objectives of this course are:
Course Objectives
Students will able to understand 2D drawings.
Course Outcomes: By the end of the course, the student will be
Draw the plan, section and elevation of a building.
Create, analyze and produce 2D drawings of buildings in AUTO CAD environment.
Detailing building plans in CAD environment.

LC-CE308: BUILDING PLANNING AND DESIGN

Lab	**: 3 Hrs/week**	**Credits : 1.5**
Int Marks	**: 50**	**Ext Marks : 50**

1. Getting started with AutoCAD.

2. Understanding the basic commands.

3. Executing Electric drawings.

4. Executing Mechanical drawings.

 5. Drawing a civil engineering structures with design notations.

6. Drawing various plans and elevations.

7. Executing a spiral stair case in 3D.

 Reading: 1. AutoCAD Manual.

Course Code &Title: MC-CE309 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE
Semester & Year of study: III & 2020-2021
Course Index: C309

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn about Introduction to traditional knowledge, Indigenous Knowledge
Learn about Protection of traditional knowledge, The Biological Diversity Act 2002 and Rules 2004, the protection of TK bill, 2016. Geographical indicators act 2003
Learn about Traditional knowledge and intellectual property, global legal FORA
Learn about Traditional knowledge in different sectors

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C309.1	Understand about Introduction to traditional knowledge, Indigenous Knowledge
C309.2	Understand about Protection of traditional knowledge, The Biological Diversity Act 2002 and Rules 2004, the protection of TK bill, 2016. Geographical indicators act 2003
C309.3	Understand about Traditional knowledge and intellectual property, global legal FOR A
C309.4	Understand about Traditional knowledge in different sectors

MC-CE309: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Theory: 2 Hrs/week   **Credits: 0**
Int Marks   : 25   **Ext Marks : 75**

UNIT I

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge.

UNIT II

Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.
The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

UNIT III

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

UNIT IV

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Text Books:
1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and   Vipin Kumar Singh, Pratibha Prakashan 2012.

Reference Books:
1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
2. "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino2

Semester IV (Second year)

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
ESC-CE401	Engineering Geology	75	25	100	3	0	0	3
PCC-CE402	Hydraulics and Hydraulic Machinery	75	25	100	3	0	0	3
PCC-CE403	Structural Analysis	75	25	100	3	0	0	3
PCC-CE404	Transportation Engineering	75	25	100	3	0	0	3
HSMC-CE405	Managerial Economics & Financial Analysis	75	25	100	3	0	0	3
LC-CE406	Transportation Engineering Lab	50	50	100	0	0	3	1.5
LC-CE407	Engineering Geology Lab	50	50	100	0	0	3	1.5
LC-CE408	Fluid Mechanics & Hydraulics Machinery Lab	50	50	100	0	0	3	1.5
MC-CE409	Skill oriented course	--	50	50	1	0	2	2
Total Credits								21.5

	Course Code &Title: ESC-CE401 ENGINEERING GEOLOGY Semester & Year of study: IV & 2020-2021 Course Index: C401
	Course Objectives: The learning objectives of this course are:
	Course Objectives
	To introduce the course: Engineering Geology to the Civil Engineering graduates.
	To enable the students, understand what minerals and rocks are and their formation and identification.
	To highlight significance/ importance/ role of Engineering Geology in construction of Civil Engineering structures.
	To enable the student, realise its importance and applications of Engineering Geology in Civil Engineering constructions.
	Course Outcomes: By the end of the course, the student will be

Course Index	Course Outcomes
C401.1	Identify and classify the geological minerals
C401.2	Measure the rock strengths of various rocks
C401.3	Classify and measure the earthquake prone areas to practice the hazard zonation
C401.4	Classify, monitor and measure the Landslides and subsidence
C401.5	Prepares, analyses and interpret the Engineering Geologic maps
C401.6	Analyses the ground conditions through geophysical surveys.

Theory: 3Hrs/week   **Credits: 3**
Int Marks: 25   **Ext Marks: 75**

UNIT-I

Introduction: Branches of geology; Importance of geology in Civil engineering.

Physical Geology: Geological processes; Weathering, Erosion, and Civil engineering importance of weathering and Erosion:

Mineralogy: Definition of mineral; Importance of study of minerals; Significance of different physical properties in mineral identification; Study of physical properties, structure and chemical composition of following common rock forming and economic minerals: Feldspar, Quartz, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Apatite , Kyanite, Garnet, Beryl, Talc, Calcite, Dolomite, Pyrite, Hematite, Magnetite, Galena, Graphite, Magnesite , Bauxite and Clay minerals:

UNIT- II

Petrology : Introduction; Definition of Rock, Civil engineering importance of petrology; Rock cycle, Geological Classification of rocks:

Igneous Rocks:Forms, Structures and textures of igneous rocks. Megascopic description and civil engineering uses of Granite, Basalt, Dolerite, Pegmatite and Charnockite:

Sedimentary Rocks:Formation; Structures and textures of sedimentary rocks. Megascopic description and civil engineering uses of Laterite, Conglomerate, Sand stone, Lime stone and Shale:

Metamorphic Rocks:Types of metamorphism; Structures and textures of metamorphic rocks. Megascopic Description and Civil engineering uses of Gneiss, Schist, Quartzite, Marble and Slate.

UNIT-III

Structural Geology: Introduction; Out crop, Strike and dip, Causes for development of secondary structures: Classification of Structures associated with rocks like Folds, Faults, Joints, Unconformities and their Civil engineering importance :

Earthquakes: Classification and causes; Intensity and magnitude and their measuring scales; Effects of earthquakes; Seismic belts; Civil Engineering considerations in seismic areas; Seismic zones of India:

Land Slides : Classification; Causes and effects; Preventive measures of landslides:

Ground water: Introduction: Classification of rocks based on porosity and permeability; Types of aquifers; Effects of groundwater over draft.

UNIT- IV

Geophysical Investigations: Geophysical methods of investigation – Over view; Electrical resistivity method; Seismic refraction method:

Dams: Types of Dams; Geological considerations for the selection of dam sites; Stages of investigation; Case histories of some dam failures; Geology of some Indian dam sites:

Tunnels: Purpose of Tunneling; Geological considerations for tunneling; Effects of tunneling; Over break; Geology of some tunnel sites:

Improvement in the Properties of Rock Mass: Materials and Methods of Grouting, Principles and mechanism of Rock bolting.

TEXT BOOK

1. A text Book of Engineering Geology by N. Chennakesavulu; Macmillan India Ltd., Delhi.

REFERENCE BOOKS

1. Principles of Engineering Geology- KVGK Gokhale - B. S. Publication

Course Code &Title: PCC-CE402 Hydraulics And Hydraulic Machinery Semester & Year of study: IV & 2020-2021 Course Index: C402

Course Objectives:
The learning objectives of this course are:

Course Objectives

To study about uniform and non uniform flows in open channel and also to learn about the characteristics of hydraulic jump.

To introduce dimensional analysis for fluid flow problems.

To understand the working principles of various types of hydraulic machines and Pumps.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C402.1	Solve uniform and non uniform open channel flow problems.
C402.2	Apply the principals of dimensional analysis and similitude in hydraulic model testing.
C402.3	Understand the working principles of various hydraulic machineries and pumps.

PCC-CE402: HYDRAULICS AND HYDRAULIC MACHINERY

Theory: 3Hrs/ Week   **Credits: 3**
Int Marks: 25   **Ext Marks: 75**

UNIT – I

UNIFORM FLOW IN OPEN CHANNEL:
Types of channels –Types of flows - Velocity distribution – Energy and momentum correction factors – Chezy's, and Manning's formulae for uniform flow – Most Economical sections, Critical flow: Specific energy-critical depth – computation of critical depth

UNIT II

NON-UNIFORM FLOW IN OPEN CHANNELS: Steady Gradually Varied flow-Dynamic equation, Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT – III

HYDRAULIC SIMILITUDE: Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat , inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle.

UNIT – IV

HYDRAULIC TURBINES – I: Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines. Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and efficiency. Governing of turbines-surge tanks-unit and specific quantities, selection of turbines, performance characteristics-geometric similarity-cavitation.

PUMPS :

CENTRAIFUGAL-PUMPS: Pump installation details-classification-work done- Manometric head-minimum starting speed-losses and efficiencies-specific speed, multistage pumps-pumps in parallel and series - performance of pumps-characteristic curves- NPSH- Cavitation.

RECIPROCATING PUMPS: Introduction, classification, components, working, discharge, indicator diagram, work done and slip.

Text Books:
1. Open Channel flow, K. Subramanya, Tata McGraw HillPublishers
2. Fluid mechanics and hydraulic machines, Rajput, A.K(2018) , S Chand ,New Delhi
3. Fluid Mechanics, Modi and Seth, Standard book house.

References:
1. Fluid Flow in Pipes and Channels, G.L. Asawa, CBS
2. Fluid Mechanics and Machinery, C.S.P. OJHA, R. BERNDTSSON and P.N. Chandramouli, Oxford Higher Education.
3. Fluid Mechanics and Machinery, Md. Kaleem Khan, Oxford Higher Education.
4. Fluid mechanics and Hydraulic machines, R.K. Bansal, Laxmi publications ,New Delhi

Course Code &Title: PCC-CE403 STRUCTURAL ANALYSIS Semester & Year of study: IV & 2020-2021 Course Index: C403	
Course Objectives: The learning objectives of this course are:	

Course Objectives:
The learning objectives of this course are:

Course Index	Course Objectives
	To give preliminary concepts of assessment of bending moment and shear force in Propped cantilevers, fixed beams and continuous beams due to various loading conditions.
	To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions
	The procedure for development of slope deflection equations and to solve application to continuous beams with and without settlement of supports.
	The concepts of moving loads and influence lines are imparted for assessment of maximum SF and BM at a given section when loads of varying spans rolling loads of Pratt and Warren trusses.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C403.1	Distinguish between the determinate and indeterminate structures
C403.2	Identify the behaviour of structures due to the expected loads, including the moving loads, acting on the structure.
C403.3	Estimate the bending moment and shear forces in beams for different fixity conditions.
C403.4	Analyze the continuous beams using various methods -, three moment method, slope deflection method, energy theorems.

<center>**UNIT – I**</center>
Displacements Of Determinate Structures Using Energy Methods
Maxwell's reciprocal theorem; Maxwell – Betti's generalized reciprocal theorem; castigliano's theorems; Application of Castigliano's theorem for calculating deflection of beams, frames and trusses; Virtual work method for deflections.

<center>**UNIT – II**</center>
Influence Lines For Statically Determinate Structures
Moving loads and influence lines; Influence lines for beam reactions; Influence lines for shearing force; Influence lines for bending moment; Calculation of maximum shear force and bending moment at a section for rolling loads; Calculation of absolute maximum bending moment; Influence lines for simple trusses.

<center>**UNIT – III**</center>
Propped Cantilevers
Analysis of propped cantilever by method of consistent deformations.

Fixed Beams
Fixed moments for a fixed beam of uniform section for different types of loading; Effect of sinking of support; Effect of rotation of a support; Bending moment diagram for fixed beams.

Clapeyron's Theorem Of Three Moments
Analysis of continuous beam by Clapeyron's theorem of three moments.

<center>**UNIT – IV**</center>
Strain Energy Method
Strain energy method for analysis of continuous beams and rigid joined plane frames up to second degree redundancy.

Redundant Pin Jointed Frames
Analysis of pin jointed frames (only single degree of redundancy); Forces in indeterminate pin jointed frames due to temperature variation and lack of fit; Composite structure.

Text Book
Analysis of Structures vols. 1 & 2 by Vazirani&Ratwani; Khanna Publishers; Delhi.

References
1. Structural Analysis by Devdas Menon, NarosaPublishinh House.
2. Indeterminate structural analysis by C. K. Wang, McGraw-Hill Publications
3. Mechanics of structures – II by Junnarkar& Shah, Charotar Publishing House
4. Structural analysis by R. C. Hibbeler, Pearson Education.
5. Basic Structural Analysis by C. S. Reddy, Tata McGraw-Hill.

Course Code &Title: PCC-CE404 TRANSPORTATION ENGINEERING Semester & Year of study: IV & 2020-2021 Course Index: C404	
Course Objectives: The learning objectives of this course are:	
Course Index	**Course Objectives**
To impart different concepts in the field of Highway Engineering	
To acquire design principles of Highway Geometrics and Pavements	
To acquire design principles of Intersections	
Course Outcomes: By the end of the course, the student will be	
Course Index	**Course Outcomes**
C403.1	Plan highway network for a given area.
C403.2	Determine Highway alignment and design highway geometrics.
C403.3	Design Intersections and prepare traffic management plans
C403.4	Judge suitability of pavement materials and design flexible and rigid pavements

Theory: 3Hrs/ Week   **Credits 3**
Int Marks: 25   **Ext Marks :75**

UNIT I

Highway Planning and Alignment: Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans– First, second, third road development plans, road development vision 2021, Rural Road Development Plan – Vision 2025; Planning Surveys; Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT – II

Highway Geometric Design: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements-Stopping sight Distance, Overtaking Sight Distance and Intermediate Sight Distance- Design of Horizontal Alignment-Design of Super elevation and Extra widening- Design of Transition Curves- Design of Vertical alignment-Gradients- Vertical curves.

UNIT – III

Traffic Engineering: Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies; Speed studies –spot speed and speed & delay studies; Parking Studies; Road Accidents-Causes and Preventive measures - Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways – Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections – Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals – Webster Method –IRC Method.

UNIT – IV

Highway Materials: Subgrade soil: classification –Group Index – Subgrade soil strength – California Bearing Ratio – Modulus of Subgrade Reaction. Stone aggregates: Desirable properties – Tests for Road Aggregates – Bituminous Materials: Types – Desirable properties – Tests on Bitumen – Bituminous paving mixes: Requirements – Marshall Method of Mix Design.

Design Of Pavements: Types of pavements; Functions and requirements of different components of pavements; Design Factors
Flexible Pavements: Design factors – Flexible Pavement Design Methods – CBR method – IRC method – Burmister method – Mechanistic method – IRC Method for Low volume Flexible pavements.
Rigid Pavements: Design Considerations – wheel load stresses – Temperature stresses –Frictional stresses – Combination of stresses – Design of slabs – Design of Joints – IRC method – Rigid pavements for low volume roads – Continuously Reinforced Cement Concrete Pavements – Roller Compacted Concrete Pavements.

TEXT BOOKS:
1. Highway Engineering, Khanna S. K., Justo C. E. G and Veeraragavan A, Nem Chand Bros., Roorkee.
2. Traffic Engineering and Transportation Planning, Kadiyali L. R, Khanna Publishers, New Delhi.

REFERENCES:
1. Principles of Highway Engineering, Kadiyali L. R, Khanna Publishers, New Delhi
2. Principles of Transportation Engineering, Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi

Course Code &Title: HSMC-ME405 MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS
Semester & Year of study: IV & 2020-2021
Course Index: C405

Course Objectives:
The learning objectives of this course are:

Course Objectives

The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.

To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.

To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital budgeting proposals.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C405.1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
C405.2	One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
C405.3	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making

HSMC-CE405: MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

Theory: 3Hrs/ Week   **Credits 3**
Int Marks: 25   **Ext Marks :75**

UNIT I

Introduction to Managerial Economics: Definition, Nature and Scope of Managerial Economics– Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT II

Theory of Production and Cost Analysis: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

UNIT III

Markets structures and Pricing Strategies: Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Objectives and Policies of Pricing- Methods of Pricing:
Business and New Economic Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

UNIT IV

Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts. Financial Analysis through ratios: Computation, Analysis and Interpretation of Liquidity Ratios. (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt-Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXT BOOKS:
1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2007.

REFERENCES:
1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. Suma Damodaran, Managerial Economics, Oxford University Press.
3. Lipsey & Chrystel, Economics, Oxford University Press.

Course Code &Title: LC-CE406 Transportation Engineering Lab **Semester & Year of study: IV & 2020-2021** **Course Index: C406**	
Course Objectives: The learning objectives of this course are:	

Course Objectives
To test crushing value, impact resistance, specific gravity and water absorption, attrition value, abrasion value, flakiness index and elongation index for the given road aggregates.
To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
To test the stability for the given bituminous mix.
To carry out surveys for traffic volume, speed and parking.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C406.1	Test aggregates and judge the suitability of materials for the road construction.
C406.2	Test the given bitumen samples and judge their suitability for the road construction.
C406.3	Obtain the optimum bitumen content for Bituminous Concrete.
C406.4	Determine the traffic volume, speed and parking characteristics.
C406.5	Draw highway cross sections and intersections.

Lab : 3 Hrs/week	Credits : 1.5
Int Marks : 50	Ext Marks : 50

SYLLABUS:

I. ROAD AGGREGATES:
1. Aggregate Crushing value Test
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption Test
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS:
1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.
5. Stripping Test
6. Viscosity Test.

III. BITUMINOUS MIX:
1. Marshall Stability test.

IV. TRAFFIC SURVEYS:
1. Traffic volume study at mid blocks.
2. Traffic Volume Studies (Turning Movements) at intersection.
3. Spot speed studies.
4. Parking study.

V. DESIGN & DRAWING
1. Earthwork calculations for road works
2. Drawing of road cross sections
3. Rotary intersection design

LIST OF EQUIPMENT:
1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers
4. Los angles Abrasion test machine
5. Deval's Attrition test machine
6. Elongation and thickness gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus
10. Viscometer.
11. Marshal Mix design apparatus.
12. Enoscope for spot speed measurement.
13. Stop Watches

TEXT BOOKS:
1. 'Highway Material Testing Manual' by S.K. Khanna, C.E.G Justo and A.Veeraraghavan, Neam Chan Brothers New Chand Publications, New Delhi.
2. Highway Material Testing & Quality Control by Rao Wiley India pvt. Ltd., Noida, New Delhi

REFERENCE BOOKS:
1. IRC Codes of Practice
2. Asphalt Institute of America Manuals
3. Code of Practice of B.I.S.

Course Code &Title: LC-CE407 ENGINEERING GEOLOGY LAB
Semester & Year of study: IV & 2020-2021
Course Index: C407

Course Objectives:
The learning objectives of this course are:

Course Index	Course Objectives
To identify the Megascopic types of Ore minerals & Rock forming minerals	
To identify the Megascopic types of Igneous, Sedimentary, Metamorphic rocks.	
To identify the topography of the site & material selection.	

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C407.1	Identify Megascopic minerals & their properties.
C407.2	Identify Megascopic rocks & their properties.
C407.3	Identify the site parameters such as contour, slope & aspect for topography.
C407.4	Know the occurrence of materials using the strike & dip problems.

LC-CE407: ENGINEERING GEOLOGY LAB

Lab: 3 Hrs /Week
Credits: 1.5
Int Marks: 50   **Ext Marks: 50**

SYLLABUS:

LIST OF EXPERIMENTS
1. Physical properties of minerals: Mega-scopic identification of
a. Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc…
b. Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc…
2. Megascopic description and identification of rocks.
a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc.
b) Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc.
c) Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
4. Simple Structural Geology problems.
5. Bore hole data.
6. Strength of the rock using laboratory tests.
7. Field work – To identify Minerals, Rocks, Geomorphology & Structural Geology.

COURSE CODETITLE:LC-CE408 FLUID MECHANICS & HYDRAULIC MACHINERY LAB
COURSE CODETITLE:LC-CE408 FLUID MECHANICS & HYDRAULIC MACHINERY LAB   **SEMESTER & YEAR OF STUDY: IV & 2020-2021**   **COURSE INDEX: C408**

Course Objectives:
The learning objectives of this course are:

Course Index	Course Objectives
To impart practical exposure on the performance evaluation methods of various flow measuring equipment and hydraulic turbines and pumps.	

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C408.1	Calculate the coefficient of discharge for Orifice meter and Venturimeter.
C408.2	Predict performance characteristics of centrifugal pump and submergible pump.
C408.3	Predict performance characteristics of turbines

Lab: 3 Hrs/Week   **Credits: 1.5**
Int Marks: 50   **Ext Marks: 50**

List of Experiments:

1. Impact of jets on Vanes.

2. Performance Test on Pelt on Wheel.

3. Performance Test on FrancisTurbine.

4. Performance Test on KaplanTurbine.

5. Performance Test on Single Stage CentrifugalPump.

6. Performance Test on Multi Stage CentrifugalPump.

7. Performance Test on Reciprocating Pump.

8. Calibration of Venturimeter.

9. Calibration of Orifice meter.

10. Determination of friction factor for a given pipe line.

11. Determination of loss of head due to sudden contraction in a pipeline.

12. Turbine flow meter.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech Civil Engineering II-I Semester
BSC-ME-301, BSC-CE-301 PROBABILITY AND STATISTICS
(MODEL QUESTION PAPER)

Time: 3Hours   Max.Marks:75

SECTION-A

Answer All Questions

1. a) State and prove Bayes' theorem   (8M)

   b) Find the moment generating function of a random variable X defined by the density function

   $$f(x) = \begin{cases} \frac{1}{3} & -1 < x < 2 \\ 0 & ealsew\ ere \end{cases}$$ (7M)

   (OR)

   c) Out of 800 families with 5 children each, how many would you expect to have

   (i) 3 boys   (ii) 5 girls   (iii) either 2 or 3 boys   (7M)

   d) There are 15 boys and 5 girls in a class. If three students are selected one after the other
   what is the probability that they are (1) All boys (2) 2 boys one girl (3) All girls.   (8M)

2. a) Let X is the random variable with the following distribution. Find $E(X)$, $E(X^2)$ (8M)

   b) Binomial distribution approaches poisson distribution as n $\to\infty$, prove this statement E

   $(2X+1)^2$ (7M)

X	-3	6	9
P(X=x)	1/6	½	1/3

   (OR)

   c) In a distribution exactly normal 7% of the items are under 35 and 89% are under 63.
   What are the mean and standard deviation of the distribution?   (8M)

   d) Fit a Poisson distribution for the following data and calculate the expected frequencies, N = 200.   (7M)

X	0	1	2	3	4
F(x)	109	65	22	3	1

3. a) Explain briefly the following : I) Point Estimation ii) Interval Estimation   (7M)

   b) A lady stenographer claims that the she can take dictation at the rate of 120 words per
   minute. Can we reject her claim on the basis of 100 trails in which she demonstrates a
   mean of 116 words with a S.D of 15 words.   (8M)

   (OR)

   c) Two independent samples of 8 and 7 items respectively had the following values.

Sample1	11	11	13	11	15	9	12	14
Sample2	9	11	10	13	9	8	10	-

   Is the difference between the means of samples significant?   (8M)

   d) A manufacturer of electric bulbs claims that the percentage of defectives in his product does
   not exceed 6. A sample of 40 bulbs is found to contain 5 defectives would you consider the claim
   justified   (7M)

4. a) Fit a second degree parabola to the following data using method of least squares.   (8M)

X	0	1	2	3	4
Y	2	3	2.5	2.6	6.5

(b) Calculate the correlation coefficient for the following heights (inches) of fathers (x) and their sons (y):   (7M)

X :   65   66   67   67   68   69   70   72

(OR)

c) Find the rank correlation coefficient for the following data   (8M)

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

d) Determine the constants 'a' and 'b' by the method of least squares such that $y = a\ e^{bx}$ fit the following data   (7M)

X	2	4	6	8	10
Y	4.077	11.084	30.128	81.897	222.62

SECTION-B

5. **Answer any five Questions**   **5X3 = 15M**
a) Two cards are selected at random from 10 cards numbered 1 to 10. Find the probability that the sum is even if the two cards are drawn one after the other with replacement.
b) State and prove addition theorem
c) Define continuous random variable and discrete random variable
d) Use Poisson recurrence formula to find probabilities x = 0 ,1 ,2 with mean 3
e) Explain the types of errors in sampling
f) If we can assert with 95% that the maximum error is 0.05 and P is given as 0.2. Find the size of the sample.
g) Write the normal equations of straight line by using method of least square
h) Define rank and correlation coefficient.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech Civil Engineering II-I Semester
PCC-CE-302 STRENGTH OF MATERIALS
(MODEL QUESTION PAPER)

Time: 3Hours   Max.Marks:75

PART-A

Answer All Questions

1.a)The extension in a rectangular steel bar of length 400 mm and thickness 10 mm is found to be 0.21 mm. the bar tapers uniformly in width from 100 mm to 50 mm. if the Young's modulus is 200 GPa, determine the axial load on the bar . (7M)

b) At a point in a strained material, the intensities of normal stresses on two planes at right angles to each other are 35 N/mm2 and 20 N/mm2 both tensile. They are accompanied by shear stress of 15 N/mm^2.Find the principal planes and principal stresses. Find also maximum shear stress. (8M)

(OR)

c) Two vertical rods one of steel and the other of copper are each rigidly fixed at the top and 50cm apart. Diameters and lengths of each rod are 2cm and 4cm respectively. A cross bar fixed to the rods at the lower ends Carries a load of 5000N such that the cross bar remains horizontal even after loading. Find the stress in each rod and position of the load on the bar. Take Es= 2.x 10^5N/mm^2, Ec= 1x 10^5N/mm^2. (8M)

d) Derive equation for the relation between three elastic moduli. (7M)

2.   a) A simple supported beam of length 8m rests on supports 6m apart, the right hand end is overhanging by 2 m. The beam carries a uniformly distributed load of 1500 N/m over the entire length. Draw the shear force and bending moment diagrams and find the point of contra flexure, if any?

(15M)

(OR)

b) A simply supported beam of span 10 m carry as UDL of 10 KN/m over a length of 3 m from left support and also from right support. Draw SF and BM diagram. (15M)

3.a) The Shear force acting on a section of a beam is 50KN. The section of the beam is T shaped of Dimensions 100mm x 100mm x 20mm as shown in the fig. The moment of inertia about the horizontal neutral axis is 314.221 x 10^4 mm^4. Calculate the shear stress at the neutral axis at the junction of the web and flange. (15M)
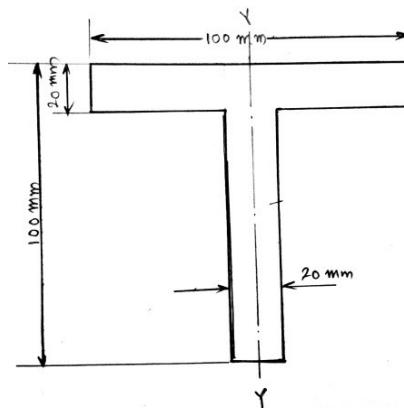
b) A steel beam of I-section, 200 mm deep and 160 mm wide has 16 mm thick flanges and 10 mm thick web. The beam is subjected to a bending moment of 200 kN m at a critical section. Determine the maximum bending stress if the web of the beam is kept horizontal. (8M)

c) Show that maximum shear stress in a beam of rectangular section is 1.5 times the average shear stress. (7M)

(OR)

4. a) Determine the maximum and minimum hoop stress across the section of a pipe of 400 mm internal diameter and 100 mm thick, when the pipe contains a fluid at a pressure of 8 N/mm². Also sketch the radial pressure distribution and hoop stress distribution across the section? (15M)

(OR)

b) A cylinder has an internal diameter of 230 mm, has walls 5 mm thick and is 1 m long. It is found to change in internal volume by 12×10-6 m3 when filled with a liquid at a pressure p. If Young's Modulus = 200 GPa and Poisson's Ratio = 0.25, and assuming rigid end plates, determine: a) The values of hoop and longitudinal stresses; b) The necessary change in pressure p to produce a further increase in internal volume of 15 %. The liquid may be assumed incompressible.

PART-B

5. Answer any five Questions   5X3 = 15M
   a) Draw the Stress- Strain diagram for Cast Iron and mention the Salient points?
   b) What are the effects of inclined load on the Beam?
   c) What is the section modulus and how it will affect the strength of the beam?
   d) What is the section modulus and how it will affect the strength of the beam?
   e) Define the torsional rigidity of the shaft? What does it represent?
   f) State the assumption made in deriving the bending equation.
   g) Derive the section modulus expression for a circular cross section.
   h) What is hoop-stress and volumetric strain in shells?

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech Civil Engineering II-I Semester
PCC-CE-303 SURVEYING AND GEOMETRICS'
(MODEL QUESTION PAPER)

Time: 3Hours   Max.Marks:75

<u>**SECTION-A**</u>

Answer All Questions

1. a) What are the different sources of errors in plane tabling? How are they eliminated?   (10M)
    b)What is two-point problem? How is it solved?   (5M)
                                          (OR)
    c) Compare the advantages and disadvantages of plane table surveying with those of chain surveying.
                                                                                                   (7M)
    d) State three-point problem plane tabling and describe its solution by trial method giving the rules which you will follow in estimating position of the point sought.   (8M)

2. a) Explain types of levels and methods of levelling? What are the Characteristics and uses of Contours, methods of contour surveying?   (15M)
                                          (OR)
   b) The following consecutive readings were taken with a level and 3 metres levelling staff on
   Continuously sloping ground at a common interval of 20 meters:
   0.602, 1.234, 1.860, 2.574, 0.238, 0.914, 1.936, 2.872, 0.568, 1.824, 2.722. The reduced level of the first point was 192.122. Rule out a page of a level field book and enter the above readings. Calculate the reduced levels of the points and also the gradient of the line joining the first and the last points.
                                                                                                   (15M)

3.a) The stadia intercept read by means of a fixed hair instrument on a vertically held staff is 2.250 metres, the angle of elevation being $3^0 42'$. The instrument constants are 100 and 0.4 m. What would be the total number of turns registered on a movable hair instrument at the same station for a 2.0 meters intercept on a staff held on the same point? The vertical angle in this case is $5^0 30'$ and the constants 1000 and 0.4 m?   (15M)
                                          (OR)
b) The following lengths and bearings were recorded in running the odolite traverse in the counter clockwise direction, the length of CD and bearing of DE having been omitted.   (15M)

Line	Length in m.	R.B.
AB	281.4	S 69^0 11' E
BC	129.4	N 21^0 49' E
CD	?	N 19^0 34' W
DE	144.5	?
EA	168.7	S 74^0 24' W

Determine the length of CD and the bearing of DE.

4. a) Explain Principle and types of E.D.M. Instruments?   (15M)
                                          (OR)
b) Explain Aerial triangulation, radial triangulation, methods?   (15M)

PART-B

5. Answer any five Questions   **5X3 = 15M**

a) Explain clearly the principle of chain surveying.

b) Compare the advantages and disadvantages of plane table surveying with those of chain surveying.

c) Distinguish between the Curvature and Refraction.

d) Explain how you would take field observations with a theodolite so as to eliminate the Index error of vertical circle.

e) Explain length of the long chord of the simple curve.

f) What is Simpson's one-third rule? Derive expression for it?

g) What is a well conditional triangle? Why is it necessary to use well-conditioned triangles?

h) What is local attraction? How is it detected and eliminated?

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech Civil Engineering II-I Semester
PCC-CE-304 FLUID MECHANICS
(MODEL QUESTION PAPER)

Time: 3Hours   **Max.Marks:75**

<u>**SECTION-A**</u>

Answer All Questions

1	a	Define the following properties of fluid with their units: i). Mass Density ii). Dynamic Viscosity iii). Surface Tension	7M
	b	The pressure outside the droplet of water of dia 0.04 mm is 10.32 N/cm^2 .calculate the pressure within the droplet if surface tension is given as 0.0725 N/m of water	8M

(OR)

	c	Define viscosity? Explain the difference between kinetic viscosity and dynamic viscosity?	7M
	d	If 5m^3 of a certain oil weighs 4000 N. Calculate the specific weight, mass density and specific gravity of this oil.	8M

2	a	Define the equation of continuity. Obtain an expression for continuity equation for a three dimensional flow?	7M
	b	A pipe of 20cm diameter conveying 0.20m^3 /s of water has a right angled bend in a horizontal plane. Find the resultant force exerted on the bend if the pressures at the inlet and outlet of the bend are 2.3kg/cm^2 and 2.2 kg/cm^2 respectively.	8M

(OR)

	c	Derive Euler's equation of motion for three dimensional steady state incompressible in viscous flow	8M
	d	Water under a pressure of 3.924 ×10-3N/m^2 is flowing through a 0.3 m pipe at the rate of 0.25 m^3 /sec. if the pipe is bent 1350 , find the magnitude and direction of the resultant force on the bend.	7M

3	a	Explain the Reynold's experiment to classify the flows	7M
	b	A laminar flow is taking place in a pipe of diameter 20cm. The maximum velocity is 1.5m/s. Find the mean velocity and the radius at which this occurs. Also calculate the velocity at 4cm from the wall of the pipe.	8M

(OR)

	c	List the minor losses in closed conduit flow and discuss their significance?	7M
	d	Two reservoirs with a difference in water level of 15m are connected by a pipe line PQR which includes two pipes of PQ and QR connected in series. Pipe PQ is 10cm in diameter having a length of 15m and has a value of f =0.03. Pipe QR is of 15cm diameter, 25m long and has f=0.016. The junctions with the reservoirs and between the pipes are abrupt. Calculate the discharge considering all minor losses. Consider all losses.	8M

4	a	Define the terms: boundary layer thickness, displacement thickness, momentum thickness and discuss their practical utility.	7M
	b	Find the ratio of skin friction drag on the front half and rear half portion of a flat plate kept in a uniform stream of zero incidences. Assume the boundary layer to be turbulent over the entire plate.	8M

(OR)

	c	Derive Von Karman momentum integral equation.	8M
	d	Find the frictional drag on one side of the plate 250mm wide and 450mm long place longitudinally in a steam crude oil (specific gravity=0.925, kinematic viscosity= 0.8 stoke) flowing with undisturbed velocity of 6.5m/s.	7M

PART-B

5   **Answer any five Questions**   5X3 = 15M

a)   How does the dynamic viscosity of liquid and gases vary with temperature?
b)   Define total pressure and centre of pressure.
c)   What is minor loss in pipe flow?
d)   Explain stream line and streak line
e)   What is the difference between laminar flow and turbulent flow?
f)   What is meant by boundary layer theory
g)   Define boundary layer separation

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech Civil Engineering II-I Semester
PCC-CE-305 Building Materials, Construction and Planning
(MODEL QUESTION PAPER)

Time: 3Hours   Max.Marks:75

SECTION-A

Answer All Questions

1.(a) Explain in detail the classification of Rocks?   (15M)

(OR)

(b) Describe in detail with neat sketch, the drying and burning methods in manufacturing of bricks?
                                                                                         (15M)

2. (a) Explain with a neat sketch (i) Stretches Bond (ii) Header Bond (iii) English Bond (iv) Flernish Bond   (15M)

(OR)

(b) What are the Seasoning methods in timber?   (15M)

(OR)

3. (a) Write about various field and laboratory test on cement?   (15M)

(OR)

(b) Explain the king post truss and Queen post truss with a neat sketch?   (15M)

4. (a) Explain how the specific gravity of aggregates carried out?   (7M)
(b) Explain how you determine moisture content of aggregate.   (8M)

(OR)

(c) Explain how aggregate toughness can be measured?   (8M)
(d) What are the requirements of good formwork?   (7M)

PART-B

5   **Answer any five Questions**   5X3 = 15M

a)   What do you mean by stone quarrying?

b)   What are the types of floors?

c)   What is a lintel? Explain

d)   Enumerate various types of cement?

e)   Distinguish between rubble masonry and caused rubble masonry.

f)   What is a vault? Explain with sketches.

g)   What is a cavity wall?

h)   List out Various ingredients of lime stone?

Time: 3Hours   **Max.Marks:75**

<u>**SECTION-A**</u>

Answer All Questions

SECTION-A (4× 15 = 60 M)

Answer ALL questions

1.a. Define Traditional Knowledge? Explain about its nature, scope and characteristics.   **(15M)**

(or)

b. Explain about the historical impact of social change on traditional knowledge system.

2.a. Explain the need of protecting the traditional knowledge significance in detail.   **(15M)**

(or)

b. what do you mean by biological diversity? Explain about Biological Acts2002.

3.a. illustrate certain non IPR mechanisms of Traditional knowledge protection.   **(15M)**

(or)

b. why do we need to protect Traditional knowledge? What benefits do traditional knowledge bring to the society.

4.a. Explain about Traditional Knowledge in sectors like Engineering and Agriculture.   **(15M)**

(or)

b. Illustrate the importance of conservation and sustainable development of Food security of the country and protection of Tk.

SECTION-A (5×3 = 15 M)

Answer Any FIVE questions

5. a) Define Western knowledge.

    b) What are different kinds of traditional knowledge?

    c) List out the role of Government to harness in TK.

    d) Illustrate different strategies to increase traditional knowledge.

    e) Define bio technology

    f) Write about indigenous knowledge.

    g) Define intellectual property.

    h) How TK related to Biodiversity.

Time: 3Hours   **Max.Marks:75**

SECTION-A

Answer All Questions.   **(4x15=60M)**

1. a) Write an essay on importance of Geology in Civil Engineering.   (8M)
    b) Write the physical properties of QUARTZ group of mineral.   (7M)
                                            (OR)
    c) Explain the importance of study of minerals.   (7M)
    d) What are the Branches of Geology? Explain.   (8M)

2. a) What is meant by rock cycle? Discuss the different types of texture of igneous rocks.   (8M)
    b) What are the common structures of sedimentary rocks?   (7M)
                                            (OR)
    c) Explain the types of metamorphism.   (8M)
    d) Distinguish between i) shale and slate ii) limestone and marble iii) granite andquartzite.   (7M)

3. a) Define focus and epicenter? What are the tectonic earthquakes, and how are they caused?   (7M)
    b) What are landslides? Classify landslides and their causes. How landslides can be prevented?   (8M)
                                            (OR)
    c) Describe the ground water exploration techniques.   (7M)
    d) What is water table? Where it occurs? Explain the types of waters.   (7M)

4. a) What is the importance of geophysical methods, classify and explain their applications.   (8M)
    b) Describe the geological considerations relating to the construction of gravity and arch type of concrete
    dam.   (7M)
                                            (OR)
    c) What are the types of dams and give their purpose?   (8M)
    d) Write about factors affecting the water-tightness of a dam reservoir.   (7M)

SECTION-B

Answer any five Questions.   **(5X3 = 15M)**

   a) What is meant by weathering?

   b) Define the term geology .

   c) List out the types of metamorphism.

   d) Write a short note on formation of metamorphism

   e) What are the causes of the earthquake?

   f) Define the terms Strike and Dip.

   g) What are the benefits of dam construction?

   h) List out the various types of aquifers

B Tech Civil Engineering II-II Semester
PCC-CE-402: Hydraulics and Hydraulic Machinery
(MODEL QUESTION PAPER)

Time: 3Hours   **Max.Marks:75**

SECTION-A

Answer All Questions.   **(4x15=60M)**

1) **a)** Derive the condition for depth of flow of a most economical circular channel Section subject to the condition for maximum velocity.
     b) A Wide channel of uniform rectangular section with a slope of 1/95 has a flow rate of 3.75 m3 /s/m. The Manning constant is 0.013. Suddenly the slope changes to 1/1420. Determine the normal depths for each case. Show that a hydraulic jump has to occur and calculate the downstream flow height.
     (OR)
     c) Explain the terms specific energy of a flowing liquid, minimum specific energy, critical depth, critical velocity and alternate depths as applied to non-uniform flow.
     d) A rectangular channel of 5 m width discharges water at the rate of 1.5 m3 /s into a 5 m wide apron with 1/3000 slope at a velocity of 5 m/s. Determine the height of the hydraulic jump and energy loss.

2) **a)** Obtain an expression for the depth after the hydraulic jump and the loss of head Due to the jump. Write the assumptions made.
     b) Determine the economical cross-section for an open channel of trapezoidal section with side slopes of 1 vertical to 2 horizontal, to carry 10 m 3 /s, the bed slope being 1/2000. Assume Manning coefficient as 0.022.
     (OR)
     c) Derive dynamic equation for GVF.
     d) Explain direct step method.

3) **a)** What do you mean by dimensional numbers? Name any four dimensional numbers. Define and explain Reynolds's number, Froude's number and Mach number. Derive expressions for any above two numbers.
     b) What is meant by geometric, kinematic and dynamic similarities?
     (OR)
     c) What are the methods of dimensional analysis? Describe the Rayleigh's method for Dimensional analysis.
     d) Explain the terms: distorted models and undistorted models. What the use is of distorted Models?

4)   **a)** Define the specific speed of the turbine? Derive an expression for the specific speed. What is the significance of specific speed of the turbine.
      b) Two jets strike at bucket of a Pelton wheel, which is having shaft power as 14,715 kW. The diameter of each jet is given as 150 mm. If the net head on the turbine is 500 m, find the overall efficiency of the turbine. Take Cv = 1.0
      (OR)
      c) What are hydro electric power plants? Also give the advantages and disadvantages.
      d) A single acting reciprocating pump running at 50 r.p.m., delivers 0.01m3 /s of water. The diameter of the piston is 200 mm and stroke length 400 mm. Determine the theoretical discharge of the pump, coefficient of discharge, slip and percentage slip of the pump.

Answer any five Questions. (5X3 = 15M)

  a) When do you call the flows as critical, sub critical and super critical flows?

  b) Give the advantages of Dimensional analysis.

  c) A jet of water strikes with a velocity of 40 m/s a flat plate inclined at 300 with the axis of the jet. If the cross sectional area of the jet is 25 cm2 determine the force exerted by the jet on the plate.

  d) What is bondage factor?

  e) What are constant head characteristic curves?

  f) What does an indicator diagram represent?

  g) What is Thomas cavitations factor?

  h) Give any three disadvantages of hydro electric power plants.

Time: 3Hours   **Max.Marks:75**

SECTION-A

Answer All Questions.   **(4x15=60M)**

1) a) Explain Castigliano's first theorem with application of simple beams.   (8M)
    b) A simply supported beam of span 'L' carries a uniformly distributed load of 'w' per unit length over the length over entire span .Find the deflection at mid span   by Castigliano's   theorem-I (EI=C0nstant).   (7M)

(OR)

    c) Find the vertical deflection of the joint 'C' of a simply supported triangular truss. ABC(Pin-jointed) carrying a point load W at C. All members are of equal length 'L' and EI= Constant.   (7M)
    d) Explain Maxwell-Betti's reciprocal theorem.   (8M)

2) a)Determine the value of maximum positive and negative shear forces and bending moment for a beam carrying a moving uniformly distributed load longer than the span.   (15M)

(OR)

    b) A Uniform load of 40 kN/m ,6 m long crosses a girder of 25 m span. Calculate the maximum shear force and bending moment at a section 10 m from left hand support. Also find out the maximum shear and the absolute maximum bending moment in the beam.   (15M)

3) a) A fixed beam of 6m span is loaded with point loads of 150 kN at a distance of 2 m from each   Support .Draw the bending moment diagram and shear force diagrams. Find also the maximum   deflection. Take E= $2X10^8$ kN/m^2 ,I=$8X10^8$mm^4.   (15M)

(OR)

    b) Analyze the continuous beam shown in figure, using three-moment equation. Draw S.F and B.M diagrams.   (15M)
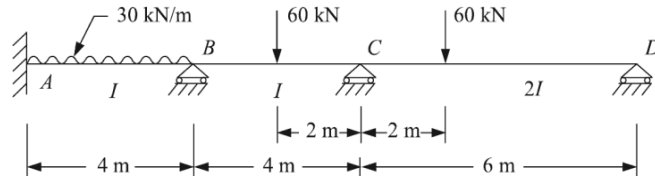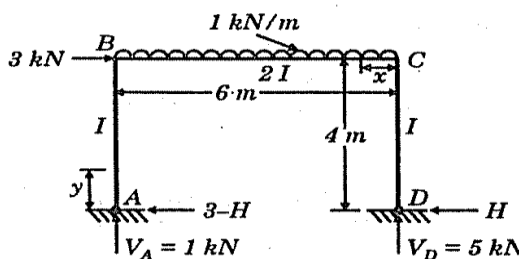

4) a) Analyse the frame shown in figure below member AB and AD have area of 4 cm^2. Determine deflection of 'A'. Take E = 2.1X 10^5 N/mm2.   (15M)
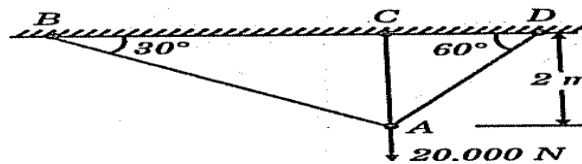
(OR)

    b) Analyse the hinged based portal frame shown in   figure a below by strain energy method?   (15M)

(a)

SECTION-B

Answer any five Questions   **(5X3 = 15M)**

    a)   State the Castigliano's theorem -I.

    b) Derive the expression for strain energy in linear elastic system due to bending moment

    c) Discuss the effects of moving loads on a simply supported girder.

    d) What do you understand by the term 'moving loads

    e) Draw the BMD for propped cantilever with prop at free end carrying a point load at   centre.

    f) List the different types of statically indeterminate beams..

    g) Define strain energy .

    h) Write a short note on composite structure.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech Civil Engineering II-II Semester
PCC-CE-404: TRANSPORTATION ENGINEERING
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions. **(4×15 =60M)**

1) a). Briefly outline the highway development in India also write it's any two practicalexamples. **(8M)**

b). Write about various road patterns? **(7M)**

(OR)

c). Compare Nagpur & Bombay Road development plans? What are the differences between good and improper alignment? **(8M)**

d). What are the objects of reconnaissance in engineering surveys? **(7M)**

2) a). Derive an expression for finding the stopping sight distance at level and at grades. **(8M)**

b). Calculate the minimum sight distance required to avoid a head on collision of two cars approaching from opposite direction at 90 and 60kmph.coefficient friction of 0.7 and a brake efficiency of 50%, in either case. **(7M)**

(OR)

c). Calculate the stopping sight distance on a highway at a descending gradient of 2% for design speed of 80 kmph, assume other data as per IRC specification. **(7M)**

d). Explain briefly about highway cross section elements. **(8M)**

3) a). What the objectives and application are of spot speed studies? **(8M)**

b). What are the advantages and disadvantages of traffic signal? **(7M)**

(OR)

c). Write a note on street parking studies? **(7M)**

d).Write the causes and preventive measures of road accidents. **(8M)**

4) a). Enumerate the various methods of flexible pavement design. **(15M**

(OR)

b). What are the requirements of materials, plants and equipments for CC road construction? Discuss briefly. **(15M)**

SECTION-B

Answer Any FIVE questions. **(5×3 = 15 M)**

a) What are the salient features of Jayakar Committee report?.

b) What are the various factors affecting highway alignment?

c) What are the objectives of highway geometric design?

d) Write a short note on SSD.

e) Discuss the scope of traffic engineering?

f) Write a short note on road marking.

g) List out various tests conducted for road aggregate.

h) List out various tests conducted for bituminous materials..

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech (Common for Mechanical Engineering, Civil Engineering) II-II Semester
HSMC-ME-405, HSME-CE-405: MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS
(MODEL QUESTION PAPER)

Time: 3Hours   **Max.Marks:75**

SECTION-A

Answer All Questions.   **(4x15=60M)**

1. a) What is managerial economics? Explain its nature and significance.

    (OR)

    b) What do you understand by elasticity of Demand? Explain the factors governing it.

2. a) Discuss about different costs in cost analysis.

    (OR)

    b) A hi-tech rail can carry a maximum of 36000 passengers per annum at a fare of Rs.400. the variable cost per passenger is Rs.150 while the fixed costs are 25, 00,000/- per year. Find the break-even point in terms of number of passengers and also in terms of fare collection.

3. a) Explain the advantages and disadvantages of partnership firm.

    (OR)

    b) Discuss the business challenges in the era of globalization.

4. a) What is capital budgeting? Explain the significance of capital budgeting.

    (OR)

    b) What is ratio analysis? Discuss the different types of balance sheet ratios.

SECTION-B

Answer any five Questions.   **(5X3 = 15M)**

a) Explain Law of demand and types of demand

b) Write about Isoquants and Isocosts

c) Explain the objectives of pricing

d) What are the profitable ratios?

e) Write about the joint stock company

f) Explain the features of Monopoly competition.

g) How to determine the demand

h) Explain about the financial statements