FOUR YEAR B. Tech. DEGREE COURSE
Scheme of Instruction and Examination
(Effective from 2020–21)

III Semester   (CE)   **Scheme : 2020**

S. No.	Category	Subject	Credits	Scheme of Instruction periods/week			Scheme of Examination Maximum Marks		
				L	D/T	P	Continuous Internal Assessment	End Exam	Total
I		*Theory*							
1	BSC	Geological Science	3	3	-	-	40	60	100
2	PCC	Strength of Materials-I	3	2	1	-	40	60	100
3	PCC	Surveying	3	3	-	-	40	60	100
4	PCC	Fluid Mechanics	3	2	1	-	40	60	100
5	PCC	Concrete Technology	3	3	-	-	40	60	100
6	MC	Constitution of India	-	2	-	-	100	-	100
II		*Practical*							
7	PCCL	Strength of Materials Lab	1.5	-	-	3	40	60	100
8	PCCL	Surveying Lab	1.5	-	-	3	40	60	100
9	PCCL	Concrete Technology Lab	1.5	-	-	3	40	60	100
10	SC	**Soft Skills Lab**	**2**	-	-	4	40	60	100
		Total	**21.5**						

GEOLOGICAL SCIENCE (GS)

III Semester : CE						Scheme : 2020	
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
CE201	**BSC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 1.5 Hrs					**End Exam Duration: 3 Hrs**		

Course Outcomes : At the end of the course the student will be able to	
CO1: Emphasize the branches of geology in various Civil Engineering projects.	
CO2: Expertise the identification of different rocks and their suitability in foundation sites and as building material.	
CO3: Understand the mitigation & assessment of geological hazards and necessary Precautionary measures to safe guard Civil Engineering structures.	
CO4: Expertise in acquiring knowledge in geological investigation methods.	
CO5: Assessment, selection and improvement of competency of sites for construction of dams, reservoirs, tunnels etc.	

UNIT – I

Introduction: Branches of geology and their usefulness to Civil Engineering.

Mineralogy: Definition – Methods of identification of minerals – Identification of minerals by physical properties – Study of common rock forming minerals.

UNIT - II

Weathering of Rocks: Influence of geological agents – Erosion and Denudation – Factors Influencing Process of Weathering – Engineering Consideration of Weathering.

Petrology: Geological classification of rocks – Genesis, classification, structures, textures of Igneous, Sedimentary & Metamorphic rocks.

UNIT – III

Structural Geology: Outcrop, strike and dip – Study of common geological structure associating with the rocks such as folds, faults unconformities and joints.

Earthquakes: Terminology, Causes, Classification, Earthquake waves, Seismograph – Intensity, Magnitude, Seismic belts – Shield areas – Seismic zones of India –Civil Engineering considerations & precautions in seismic regions.

*Landslides***:** Causes, effects, preventive measures.

UNIT – IV

Geophysical Studies: Principle, instrumentation, operation of field and laboratory tests by static and dynamic methods – Core logging, RQD for site selection.

UNIT - V

Geologyof Dams and Reservoirs: Geological considerations in the selection of dam site. Analysis of dam failures of the past.

Tunnels: Purposes of tunneling, Effects of tunneling on the ground. Role of Geological Considerations in tunneling.

Text Books
1. N. Chenna Kesavulu, *Text book of Engineering Geology*, MacMillan India Ltd, Hyderabad.
2. D. Venkat Reddy, *Engineering Geology for Civil Engineers*, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi

Reference Books
1. Dr. Anil Kumar Mishra, *Engineering Geology*, S. Chand & Company Ltd., New Delhi.
2. S. K. Garg, *A Text book of Geology*, Khanna Publishers, New Delhi.
3. B. S. Sathyanarayana Swamy, *Structural Geology*, Dhanpat Rai & Sons, New Delhi
4. Dr. B.P.Verma, *Rock Mechanics for Engineers*, Khanna Publishers, NewDelhi.

Question Paper Pattern:

Sessional Exam: The question paper for sessional examination is for 25 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. The question paper shall consist of Three Sections with Two Questions (EITHER / OR type) in each section. The student shall answer one question from each section.

End Exam: The question paper for end examination is for 60 marks. It shall consist of Five Units, each containing Two Questions (EITHER / OR type) from each unit of the syllabus, with a weightage of 12 marks. Each of these questions may contain sub-questions. The student shall answer one question from each unit.

STRENGTH OF MATERIALS – I (SM1)

III Semester :CE						Scheme : 2020	
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
CE202	PCC	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**Total**
		2	1	-	3	40	60	100
Sessional Exam Duration : 1.5 Hrs					**End Exam Duration: 3 Hrs**		

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

CO1: Determine shear force and bending moment for determinate beams under transverse loading and draw shear force and bending moment diagrams.

CO2: Determine the bending and shear stress variation for determinate beams.

CO3: Determine slope and deflection of determinate beams using Double integration method, Macaulay's method and Moment area method.

CO4: Analyse the short column and long column under axial and eccentric loading and thermal stresses and strains in composite sections.

CO5: Analyse the effect of torsion on circular shafts and Understand the concepts of springs.

UNIT – I

Shear Force and Bending Moments: Types of supports – Types of beams – Shear force and bending moment diagrams for cantilever, simply supported, over hanging beams with point loads, uniformly distributed load, uniformly varying loads and couples, combination of loads – Relationship between shear force and bending moment and rate of loading at a section of a beam.

UNIT - II

Flexural Stresses: Theory of simple bending **–** Assumptions – Equation for simple bending – Bending stresses in beams - Section modulus of rectangular and circular sections (solid and hollow) - I, T, Angle and channel sections – Efficiency of various cross sections of beams.

Shear Stress: Derivation of formulae – Shear stress distribution in various beam sections like rectangular, triangular, circular, I and T sections, Built up section.

UNIT – III

Deflection of Determinate Beams: Slope, deflection and radius of curvature and their relationship – Strength and stiffness of beams – Finding slope and deflections using Double integration method, Macaulay's method and Moment Area method.

UNIT – IV

Stresses and Strains in Composite Sections: Analysis of bars of composite section– Thermal Stresses in simple and composite bars.

Direct and Bending Stresses: Combined direct and bending stresses – Eccentric loading – Limit of eccentricity and core of section, wind pressure on walls and chimney shafts.

Columns and Struts: Introduction, slenderness ratio – Euler's formulae for long columns with different end conditions – Limitations of Euler's theory – Rankine's theory – Derivation of Rankine's Formula – Long Columns under eccentric loading– Secant formula.

UNIT - V

Torsion of Circular Shafts: Theory of pure Torsion – Derivation of Torsion equation – Assumptions made in pure torsion – Torsional theory applied to hollow and solid circular shafts – Power transmission by shafts.

Springs: Introduction – Types of Springs –Closed and open coiled helical springs under axial loads and axial twist – Springs in series and parallel– Carriage springs.

Text Books

1. B.C Punmia, Ashok Kumar Jain & Arun Kumar Jain, *Mechanics of Materials*, Laxmi Publications, New Delhi.
2. R.K. Rajput, *Strength of materials*, S.Chand & Co., New Delhi.
3. R.K. Bansal, *Strength of materials*, Laxmi Publications, New Delhi.

Reference Books

1. F.L. Singer and A.Y. Pytel, *Strength of materials*, Harper & Row Publications.
2. Bhavikatti, *Strength of materials*, S. Chand & Co., New Delhi.
3. Timoshenko & Young, *Elements of Strength of materials*, Eastern Wiley Publications.
4. D.S. PrakashRao, *Strength of Materials*, University Press Publications, Hyderabad.
5. R. Subramanian, *Strength of Materials*, Oxford University.

Question Paper Pattern:

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End Exam: The question paper for end examination is for 60 marks. It shall consist of Five Units, each containing Two Questions (EITHER / OR type) from each unit of the syllabus, with a weightage of 12 marks. Each of these questions may contain sub-questions. The student shall answer one question from each unit.

SURVEYING (SUR)

III Semester :CE					Scheme : 2020		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
CE203	**PCC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**Total**
		3	-	-	3	40	60	100
Sessional Exam Duration : 1.5 Hrs					**End Exam Duration: 3 Hrs**		

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

CO1: Use various conventional instruments involved in surveying with respect to utility and precision.

CO2: Plan a survey, taking accurate measurement, booking of field measurements, plotting and adjustment of traverse.

CO3: Understand the methods of levelling, contouring and find the elevations & distances of inaccessible objects.

CO4: Understand the setting out methods of different types of curves and building / culvert.

CO5: Understand photogrammetry and Triangulation survey

UNIT – I

*Introduction to Surveying***:** Definition, principles and classification of surveying.

Chain Surveying: Principles of chain survey – Methods of measuring horizontal and slope distance – Ranging – Chaining past obstacles – Plotting of chain survey.

Compass Surveying: Construction and working of prismatic compass – Types of bearing – Plotting of a traverse– Declination, dip, local attraction.

UNIT - II

Levelling: Principle of levelling – Methods of levelling –Booking of readings – Contouring – Trigonometric levelling.

Plane Table surveying: Methods – Errors.

UNIT – III

Theodolite Surveying: Theodolite traversing – Methods of traversing – Measurement of horizontal and vertical angles – Omitted Measurements.

Tacheometric Surveying: Principle of tacheometric surveying – Distance equation for horizontal and inclined line of sights –Tangential Tacheometry – Errors.

UNIT – IV

Curves: Types of curves – Terminology – Elements of simple circular curve – Setting out methods – Elements of compound curve – Transition curve – Types – Methods of determination of length – Characteristics and elements of transition curve.

Vertical curve – Types and length of vertical curves – Setting out of foundation trench of a building and culvert.

UNIT - V

Photogrammetry: Principles of photogrammetry and branches of photogrammetry – Types of photographs – Scale of photographs – Overlap and photo interpretation.

Triangulation network – Signals – Base line measurement – Inter-visibility of stations.

Text Books

1. B.C. Punmia, A.K. Jain and A.K. Jain, *Surveying Vol. I & II*, Laxmi Publications (P) Ltd., New Delhi.

2. R. Agor, *A Text Book of Surveying & Levelling*, Khanna Publishers, New Delhi.

3. R. Agor, *A text book of Advanced surveying*, Khanna Publishers, New Delhi.

4. N.N. Basak, *Surveying and Levelling*, Tata McGraw Hill Publishers, New Delhi.

Reference Books

1. Arora K.R., *Surveying vol. I & II*, Standard book house.

2. R. Subramanyam, *Surveying and Levelling*, Oxford University Press, New Delhi.

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Sessional Exam: The question paper for sessional examination is for 25 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. The question paper shall consist of Three Sections with Two Questions (EITHER / OR type) in each section. The student shall answer one question from each section.

End Exam: The question paper for end examination is for 60 marks. It shall consist of Five Units, each containing Two Questions (EITHER / OR type) from each unit of the syllabus, with a weightage of 12 marks. Each of these questions may contain sub-questions. The student shall answer one question from each unit.

FLUID MECHANICS (FM)

III Semester :CE						Scheme : 2020	
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
CE204	**PCC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**Total**
		2	**1**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 1.5 Hrs					**End Exam Duration: 3 Hrs**		

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

CO1: Understand the fluid properties and measure the fluid pressure.

CO2: Check the stability of floating and submerged bodies.

CO3: Solve problems related to static and dynamic conditions of fluid.

CO4: Measure the discharge through pipes, tanks and channels.

CO5: Understand the laminar and turbulent flows, major and minor losses in pipes.

CO6: Understand the concepts of boundary layer theory and dimensional analysis.

UNIT – I

Fluid Properties: Definition of a fluid – Density – Specific weight – Specific volume – Specific gravity – Compressibility – Vapour pressure – Surface tension and capillarity – Viscosity.

Fluid Statics: Pascal's law – Hydrostatic law – Atmospheric, gauge and absolute pressures – Measurement of pressure – Piezometer – U–tube manometer and U–tube differential manometer – Bourdon's pressure gauge – Hydrostatic forces on plane and curved surfaces.

UNIT - II

Buoyancy and Floatation: Buoyancy – Buoyant force and centre of buoyancy – Metacentre and metacentric height – Stability of submerged and floating bodies – Determination of metacentricheight.

Fluid Kinematics: Types of flow – Streamline – Streak line – Path line – Continuity equation in one and three dimensional forms – Stream function and velocity potential function – Flow net – Acceleration of a fluid particle – Types.

UNIT – III

Fluid Dynamics: Surface and Body forces – Euler's equation of motion along a streamline – Bernoulli's energy equation – Energy correction factor – Impulse–momentum equation – Momentum correction factor – Force on a bend.

Flow Measurement: Velocity measurement by Pitot tube and Pitot static tube – Discharge measurement by Venturimeter and Orificemeter – Flow through Orifices and mouthpieces – Notches and weirs.

UNIT – IV

Laminar and Turbulent Flow: Reynold's experiment – Reynold's number – Laminar flow through circular pipes – Hagen Poiseuille equation – Turbulent flow – Darcy-Weisbach

equation – Friction Factor – Rough and smooth pipes – Variation offriction Factor – Moody's chart.

Flow Through Pipes: Losses in pipe flow – Major and Minor – Concept of H.G.L and T.E.L – Syphon – Pipes in series and pipes in parallel – Compound pipe.

UNIT - V

Boundary Layer Theory: Boundary layer – Growth over a flat plate – Boundary layer thickness – Nominal, displacement, momentum and energy thickness – Laminar sub layer – Separation of boundary layer.

Concept of Drag and Lift: Drag and lift over a submerged body – Pressure drag – Friction drag – Total drag.

Dimensional Analysis and Similitude: Units and dimensions – Dimensional homogeneity – Rayleigh's method – Buckingham π theorem –Geometric, kinematic and dynamic similarities – Dimensionless numbers – Model and prototype relations – Distorted models.

Text Books

1. P.N. Modi& S.M. Seth, *Hydraulics and Fluid Mechanics including Hydraulic Machines*, Standard Book House, New Delhi.

2. R.K. Rajput, *A Text Book of Fluid Mechanics and Hydraulic Machinery*, S.Chand & Co., New Delhi.

3. R.K. Bansal, *A Text Book of Fluid Mechanics and Hydraulic Machinery*, Laxmi Publications (P) Ltd.

Reference Books

1. Streeter & Wylie, *Fluid Mechanics*, McGraw Hills Publications.
2. C.M. White, *Fluid Mechanics*, McGraw Hills Publications.
3. Bernard Massey, *Mechanics of Fluids*, Taylor & Francis.

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CONCRETE TECHNOLOGY (CT)

III Semester :CE					Scheme : 2020		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
CE205	**PCC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 1.5 Hrs					**End Exam Duration: 3 Hrs**		

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

CO1: Determine the properties of concrete Ingredients.

CO2: Understand the properties of concrete both in fresh and hardened state.

CO3: Understand the long term behavior of concrete.

CO4: Compute the mix design of concrete using Indian Standard methods.

CO5: Understand the usage of special concretes according to the existing situations.

UNIT – I

Cement &Admixtures: Portland cement – Chemical composition – Hydration – Setting and fineness of cement – Structure of hydrated cement – Mechanical strength of cement gel – Water held in hydrated cement paste – Heat of hydration – Influence of compound composition and properties of cement – Tests on cements – Types of admixtures – Plasticizers – Super plasticizers – Mineral admixtures.

Aggregates: Classification of aggregates – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, bulk density, porosity, absorption & moisture content of aggregate – Bulking of sand – Deleterious substances in aggregate – Soundness of aggregate – Alkali aggregate reaction – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse aggregates – Gap graded aggregates – Maximum size of aggregate.

UNIT - II

Fresh & Hardened Concrete: Workability – Factors affecting workability – Measurement of workability – Slump test, Compaction factor test, Flow test, Vee–Bee test and Ball penetration test – Effect of time and temperature on workability – Segregation and Bleeding.

Water/Cement ratio – Abrams' law – Gel space ratio – Effective water in the mix – Strength in tension and compression – Factors affecting strength of concrete – Effect of age and temperature on strength of concrete – Relationship between compressive and tensile strengths – Curing of concrete – Methods – Quality of mixing water – Destructive and Non-Destructive Tests on hardened concrete

UNIT – III

Elasticity, Creep & Shrinkage: Modulus of elasticity – Dynamic modulus of elasticity –

Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – Types of shrinkage.

Durability of concrete – Types and causes of cracks.

UNIT – IV

Mix Design: Various methods of mix design– Proportioning of concrete mix by IS Method – Relation between mean and maximum strengths – Maximum size of aggregate – Grading and type of aggregate – Aggregate/Cement ratio – Mix proportions and weights per batch.

UNIT - V

Special Concretes: Ready mix concrete –Pervious concrete – Polymer concrete – Bacterial concrete – Lightweight aggregate concrete –Fibre reinforced concrete –High density concrete – High performance concrete – Geopolymer Concrete – Self compacting concrete.

Text Books

1. A.M.Neville, *Properties of Concrete*, Pearson Education, New Delhi.
2. R.P. Rethaliya, *Concrete Technology,* Charotar Publication.
3. M.S.Shetty, *Concrete Technology*, S.Chand Company Ltd.

Reference Books

1. P.D. Kulkarni, R.K. Ghosh and Y.R. Phaul, *Text Book of Concrete Technology*, New Age International.
2. M.L. Gambhir, *Concrete Technology*, Tata McGraw Hill Publishers.

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End Exam: The question paper for end examination is for 60 marks. It shall consist of Five Units, each containing Two Questions (EITHER / OR type) from each unit of the syllabus, with a weightage of 12 marks. Each of these questions may contain sub-questions. The student shall answer one question from each unit.

CONSTITUTION OF INDIA (CI)

III Semester : Common for all Branches						Scheme : 2020	
Course Code	Category	Hours / Week			Credits	Maximum Marks	
MC103	Mandatory Course	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		2	-	-	-	100	-	100

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

CO1: Understand the formation and principles of Indian Constitution.

CO2: Understand structure and functions of Union government and State executive. Duties of President, Vice president, Prime Minister, Governor, Chief Minister cabinet and State legislature.

CO3: Understand constitutional amendments of 42, 44,74,76,86 and 91. Central-State relations, President rule.

CO4: Understand Indian social structure and languages in India. Rights of women, SC, ST and then weaker section.

CO5: Understand the structure of Judiciary, Role and functions of Supreme Court, High court and Subordinate courts, Judicial review.

UNIT - I

Historical back ground – Significance of Constitution – Making of the constitution – Role of the Constituent Assembly – Salient features – Preamble – Citizenship – Procedure for amendment of Constitution – Fundamental rights – Derivative Principles of state policy – Elections in India.

UNIT - II

Union Executive: Structure of the Union Government & its functions – President – Vice-President – Prime Minister – Cabinet – Parliament.

State Executive: Structure and functions – Governor – Chief Minister – Cabinet – State Legislature.

UNIT - III

Central-State Relations, President's Rule – Constitutional Amendments [42, 44, 74, 76, 86 & 91] – Constitutional functionaries – Working of Parliamentary system in India.

UNIT - IV

Indian Social Structure – Languages in India – Political Parties & Pressure groups – Rights of Women – S.Cs, S.Ts & other weaker sections.

UNIT - V

Judiciary: Structure, Organisation of Judiciary – Independence of the Judiciary – Role and functions of Supreme Court, High Courts & Sub ordinate Courts – Judicial Review.

Text Books :
1. Durga Das Basu, *Introduction to the Constitution of India*, Wadwa & Company
2. Macivel, Page, *An Introduction Analysis* Society
3. M.V. Pylee, *Indian Constitution*, S. Chand Publications
4. Subhash C Kashyap, *Our Constitution*, National Book Trust of India.
5. Dr. S.M.Rajan ,*Constitutional Law of India*
Reference Books :
1. *The Constitution of India*, By the Ministry of Law and Justice, The Govt. of India.
2. C. Kashyap Subhasah, *Constitutional Law of India*
3. M.P.Jain, *Indian Constitution Law*
4. H.M. Seervai, *Constitutional Law of India*
Web References:
1. https://www.india.gov.in/my-government/constitution-india

STRENGTH OF MATERIALS LAB [SM(P)]

III Semester : CE						Scheme : 2020	
Course Code	Category	Hours / Week			Credits	Maximum Marks	
CE206	PCCL	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		-	-	3	1.5	40	60	100
						End Exam Duration : 3 Hrs		

Course Outcomes: The student shall be able

CO1: Determine the mechanical properties of steel, brass, aluminum and other engineering materials.

CO2: Determine the deflections in simply supported and overhanging beams.

CO3: Determine the hardness, compressive strength, shear strength and impact strength of materials.

CO4: Develop skills to analyse and interpret the experimental data.

List of Experiments

1. Determination of the stress–strain characteristics of steel bar using universal testing machine.

2. (a) Determination of compressive strength of wood specimen.
   (b) Determination of direct shear strength of circular steel bar using compression testing machine.

3. Determination of modulus of elasticity of given material by measuring deflection in simply supported and overhanging beam.

4. Determination of modulus of elasticity of rolled steel joist by measuring deflection using universal testing machine.

5. Determination of modulus of rigidity of given material using torsion testing machine.

6. Determination of modulus of rigidity of given material using spring testing machine.

7. Determination of tensile, compressive and shear strengths of given materials using tensometer.

8. Determination of hardness of given metal specimen using Brinnell's Hardness Testing Machine and Rockwell Hardness Testing Machine.

9. Determination of impact strength (Izod and Charpy) using impact testing machine.

10. Determination of modulus of elasticity by conducting flexural test on carriage spring.

SURVEYING LAB [SUR(P)]

III Semester : CE						Scheme : 2020	
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**	
CE207	**PCCL**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**Total**
		-	**-**	**3**	**1.5**	**40**	**60**	**100**
						End Exam Duration : 3 Hrs	

Course Outcomes: The student shall be able
CO1: Apply the knowledge, techniques, skills and applicable tools of the discipline to engineering and surveying activities.
CO2: Perform survey, taking accurate measurements, booking of field measurements, plotting and adjustment of traverse.
CO3: Prepare contour map of an area and L.S & C.S of the given project.
CO4: Calculate the Elevations and Distances of accessible and inaccessible points.
CO5: Set out the Curve and Foundation trench of a building & culvert.

List of Experiments
1. Introduction to basic surveying Instruments and their applications.
2. Solves the obstacle problem using chain and prismatic compass.
3. Perform different methods of levelling and find the reduced level of given points.
4. Prepares contour map of an area and plots the Longitudinal & Cross Sections of the given project.
5. Practice different methods of Trigonometrical levelling and find the elevations &distances of accessible/inaccessible points using theodolite.
6. Applying the method of tachometry, find the gradient between the given points.
7. Setting out the simple circular curve–linearmethod.
8. Setting out the simple circular curve–angular method.
9. Setting out the foundation trench of a building.
10. Setting out the foundation trench of a culvert.

CONCRETE TECHNOLOGY LAB [CT(P)]

III Semester: CE						Scheme:2020	
Course Code	Category	Hours/Week			Credits	Maximum Marks	
CE208	PCCL	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		-	-	3	1.5	40	60	100
						EndExamDuration:3Hrs		

Course Outcomes: On completion of this course, the student will be able to

CO1: Determine the properties of cement as per IS specifications.

CO2: Determine the properties of aggregates as per IS specifications.

CO3: Determine the properties of fresh concrete as per IS specifications.

CO4: Determine the properties of hardened concrete as per IS specifications.

CO5: Determine the strength of concrete by NDT.

List of Experiments

1.a) Fineness of cement by dry–sieving method & Blair's air permeability apparatus
   b) Specific gravity of cement

2.a) Standard consistency of cement paste
   b) Soundness of cement (By Lechatelier method)

3. Initial and final setting of cement

4. Compressive strength of cement

5.a) Grain size distribution of fine aggregate
   b) Specific gravity of fine aggregate

6.a) Grain size distribution of coarse aggregate
   b) Specific gravity of coarse aggregate

7. Bulking of sand

8.a) Workability of fresh concrete by slump cone method
   b) Workability of fresh concrete by compaction factor method

9. a) Compressive strength of concrete
   b) Split tensile strength of concrete
   c) Modulus of rupture of concrete

10. Demonstration of rebound test hammer and concrete core cutter.

SOFT SKILLS LAB [SS(P)]

III / IV Semester: Common for all Branches					Scheme : 2020		
Course Code	Category	Hours / Week			Credits	Maximum Marks		
SCCM01	Skill oriented Course	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		-	-	4	2	40	60	100

Course Outcomes: The student shall be able to

CO1: Communicate effectively and enhance their interpersonal relationship building skills with renewed self-confidence.

CO2: Work together in teams and accomplish objectives in a cordial atmosphere.

CO3: Face interviews, GDs and give presentations.

CO4: Understand and develop the etiquette necessary to present themselves in a professional setting.

CO5: Learn the Principles of Personal effectiveness.

List of Experiments

1. Ice breaking Activities, Principles of Time and Stress Management
2. Art of speaking -1 (Prepared)
3. Art of speaking -2 (Extempore)
4. Art of writing - Essay / Picture / Story
5. Business etiquette - Telephone and email
6. Presentation Skills - Power point making
7. Group Discussion – Objectives and Skills tested in a GD, types of GD, Dos and don'ts
8. Group Discussion - Practice
9. Team work - Drama / Skit / Role play
10. Paper / Poster Presentation
11. Problem Solving by lateral thinking puzzles
12. Know your General Awareness / Knowledge - Quiz
13. Principles of Personal excellence

Reference Books :

1. Stephen R. Covey, *The Seven Habits of Highly Effective People*, Pocket Books Publishers, London
2. Priyadarshani Patnaik, *Group Discussion and Interview Skills with VCD*, Foundation Books.
3. Sangeeta Sharma & Binod Mishra, *Communication Skills for Engineers and Scientists*, PHI Learning Private Limited.
4. Shiv Khera, *You Can Win*, MacMillan India Publishers, New Delhi
5. Campus Connect Portals - TCS - https://campuscommune.tcs.com; Infosys - http://campusconnect.infosys.com/

FOUR YEAR B. Tech. DEGREE COURSE
Scheme of Instruction and Examination
(Effective from 2020–21)

IV Semester   (CE)   **Scheme : 2020**

S. No.	Category	Subject	Credits	Scheme of Instruction periods/week			Scheme of Examination Maximum Marks		
				L	D/T	P	Continuous Internal Assessment	End Exam	Total
I		*Theory*							
1	ESC	Environmental Engineering	3	3	-	-	40	60	100
2	PCC	Strength of Materials - II	3	2	1	-	40	60	100
3	PCC	Transportation Engineering	3	3	-	-	40	60	100
4	PCC	Hydraulics & Hydraulic Machinery	3	2	1	-	40	60	100
5	HSMC	Managerial Economics & Principles of Accountancy	3	3	-	-	40	60	100
II		*Practical*							
6	PCCL	Geographical Information Systems Lab	1.5	-	-	3	40	60	100
7	PCCL	Transportation Engg. Lab	1.5	-	-	3	40	60	100
8	PCCL	Fluid Mechanics Lab	1.5	-	-	3	40	60	100
9	SC	**Advanced Surveying Lab**	2	1	-	2	40	60	100
		Total	**21.5**						

ENVIRONMENTAL ENGINEERING (EE)

IV Semester : CE					Scheme : 2020		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
CE209	**ESC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 1.5 Hrs					**End Exam Duration: 3 Hrs**		

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

CO1: Estimate the water demand considering future projection of population.

CO2: Evaluate various sources of water in terms of quantity and quality.

CO3: Analyze and design unit operation of water treatment units.

CO4: An ability to distribute the treated water to public including pipe network.

CO5: Able to understand the different aspects of Air & Noise pollution.

UNIT – I

Introduction: Need for protected water supply – Objectives of water supply systems – Water borne diseases and their control.

Quantity: Design period – Population forecast – Rate of consumption for various purposes – Fluctuations in demand – Factors governing the rate of demand – Fire demand.

UNIT - II

*Quality***:** Sampling – Routine water analysis for physical, chemical and bacteriological characteristics and their significance – Water quality index – Standards for drinking water.

*Sources of Water Supply***:** Classification – Suitability of sources with reference to quantity and quality – Infiltration galleries and wells – choice of source.

*Collection and Conveyance***:** Intake structures – Lake, canal, river and reservoir intake – Types of conduits – Hydraulic design of pressure pipes – Materials for pipes – Pipe joints – Laying and testing of pipes.

UNIT – III

*Treatment of Water***:** Layout and general outline of water treatment units – Principles and design of plain sedimentation and coagulation tanks – Working and design of slow sand filters, rapid sand filters and pressure filters – Different methods of disinfections – Chlorination practices – Breakpoint chlorination **–** Aeration – Softening.

UNIT – IV

*Distribution System***:** Water supply systems – Layouts of distribution system – Analysis of water distribution system using Hardy Cross method – Mass curve application to calculate the storage capacity of the distribution reservoir – Different types of valves and fire hydrants.

UNIT - V

Air Pollution: Types of pollutants, their sources and impacts – Air pollution control – Air

quality standards – Air quality index and limits.

*Noise Pollution***:** Impacts of noise – Permissible limits of noise pollution – Measurement of noise and control of noise pollution.

Text Books

1. Santosh Kumar Garg, *Environmental Engineering Vol.1*, Khanna Publications.

2. S.K. Hussain, *Water supply and sanitary Engineering*, Oxford & IBH.

3. C.S. Rao, Environmental Pollution Control Engineering, New Age International publishers.

Reference Books

1. H.W. Peavy, D.G. Rowe and George Tchobanoglaus, *Environmental Engineering*, Tata McGraw Hill.

2. E.W. Steel, *Water supply and Sewerage*, Tata McGraw Hill.

3. Sawyer and McCarthy, *Chemistry for Environmental engineering*, Tata McGraw Hill.

4. CPHEEO, Ministry of Urban Development, *Manual on water supply and Treatment,* New Delhi.

5. Mark J. Hammer & Mark J. Hammer Jr., *Water and Waste Water Technology*, John Wiley Publications.

Question Paper Pattern:

Sessional Exam: The question paper for sessional examination is for 25 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. The question paper shall consist of Three Sections with Two Questions (EITHER / OR type) in each section. The student shall answer one question from each section.

End Exam: The question paper for end examination is for 60 marks. It shall consist of Five Units, each containing Two Questions (EITHER / OR type) from each unit of the syllabus, with a weightage of 12 marks. Each of these questions may contain sub-questions. The student shall answer one question from each unit.

STRENGTH OF MATERIALS –II (SM2)

IV Semester :CE						Scheme : 2020	
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
CE210	PCC	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**Total**
		2	1	-	3	40	60	100
Sessional Exam Duration : 1.5 Hrs					**End Exam Duration: 3 Hrs**		

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

CO1: Analyse thin cylindrical and spherical shells subjected to pressure.

CO2: Analysis of two dimensional stress at a point and understand the concepts of theories of failure.

CO3: Analyse the propped cantilever and fixed beams subjected to transverse loads and draw shear force and bending moment diagrams.

CO4: Analyse the continuous beams subjected to transverse loads and draw shear force and bending moment diagrams.

CO5: Analyse structural elements subjected to unsymmetrical bending.

CO6: Understand the concepts of shear flow and shear centre.

UNIT – I

Thin Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stress – Hoop, longitudinal and volumetric strains – Change in diameter, volume of thin cylinders – Thin spherical shells.

Thick Cylinders: Thick cylinders – Lame's equation – Design of thick cylindrical shells – Compound cylinders – Shrink fit allowance – Initial difference of radii at the junction.

UNIT - II

Analysis of Plane Stress at a Point: Analysis of two dimensional stress at a point – Principal planes – Principal stresses and strains – Mohr's circle of stress.

Elastic Theories of Failure: Introduction – Maximum principal stress theory – Maximum principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum distortion energy theory – Application to shafts and thick cylinders.

UNIT – III

Indeterminate Structures: Introduction to indeterminate structures.

Propped Cantilever: Analysis of propped cantilever beams for bending moments, shear forces, slopes and deflections.

Fixed Beams: Analysis of fixed beams for bending moments, shear forces, slopes and deflections with and without sinking of supports for point loads, uniformly distributed loads, uniformly varying loads and couples.

UNIT – IV

Continuous Beams: Clapeyron's theorem of three moments – Derivation of theorem – Application to continuous beams – Effect of sinking of supports – Shear force and bending moment diagrams.

UNIT - V

Unsymmetrical Bending of Beams: Centroidal principal axes of bending – Moment of inertia about the principal axes – Resolution of bending moment into two components along principal axes – Determination of stresses.

Shear Centre: Shear Flow and Shear Centre for Thin walled Channel, I-sections.

Text Books

1. B.C. Punmia Ashok Kumar Jain and Arun Kumar Jain, SMTS- 2, *Theory of Structures*, Laxmi Publications.

2. R.K. Rajput, *Strength of materials*, S.Chand& Co., New Delhi.

3. R.K. Bansal, *Strength of materials*, Laxmi Publications, New Delhi.

Reference Books

1. F.L. Singer and A.Y. Pytel, *Strength of materials*, Harper & Row Publications.
2. Bhavikatti, *Strength of materials*, S. Chand & Co., New Delhi.
3. Timoshenko & Young, *Elements of Strength of materials*, Eastern Wiley Publications.
4. R. Subramanian, *Strength of Materials*, Oxford University.

Question Paper Pattern:

Sessional Exam: The question paper for sessional examination is for 25 marks, covering half of the syllabus for first sessional and remaining half for second sessional exam. The question paper shall consist of Three Sections with Two Questions (EITHER / OR type) in each section. The student shall answer one question from each section.

End Exam: The question paper for end examination is for 60 marks. It shall consist of Five Units, each containing Two Questions (EITHER / OR type) from each unit of the syllabus, with a weightage of 12 marks. Each of these questions may contain sub-questions. The student shall answer one question from each unit.

TRANSPORTATION ENGINEERING (TE)

IV Semester : CE						Scheme : 2020	
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**	
CE211	**PCC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**Total**
		3	-	-	3	40	60	100
Sessional Exam Duration: 1.5 Hrs					**End Exam Duration : 3 Hrs**		

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

CO1: Understand the importance of transportation, classification of highways and conduct the surveys required for highway alignment.

CO2: Understand the elements of highway geometric design.

CO3: Understand and apply the principles of Traffic Engineering.

CO4: Understand the various traffic control devices along with the design of signals.

CO5: Analyze and design the flexible and rigid pavements as per IRC specifications.

UNIT - I

Highway Development and Planning: Importance of transportation – History of Planned Highway Development in India– Twenty Year Road development plans – Classification of roads – Road patterns

Highway Alignment: Highway alignment – Basic requirements – Controlling factors – Engineering surveys for highway location – Points considered in a new highway project.

UNIT - II

Geometric Design of Streets and Highways: Introduction – Parameters controlling geometric design – Cross sectional elements – Sight distances — Horizontal alignment – Super elevation – Design of super elevation – Transition curve – Extra widening on curves – Vertical alignment – Gradients – Vertical Curves.

UNIT - III

Traffic Engineering: Introduction – Basic parameters of traffic – Speed, flow and density– Their interrelationship – Traffic studies – Traffic volume counts – Speed studies–Presentation of volume and speed data, Statistical and graphical methods – Parking parameters and parking studies – Accident studies.

UNIT - IV

Traffic Control and Management: Introduction – Traffic control devices – Signs; Classification of road signs and their design specifications– Road markings –Channelization – Traffic signal design by Webster method – Intersections – Rotary intersection – Grade separated intersections (interchanges) – Road safety.

UNIT - V

Flexible Pavement Design: Pavement types – Components and their functions – Design factors

– Flexible pavement design – IRC method based on CBR only.

Rigid Pavement Design: Calculation of stresses – Design of joints, dowel bars, tie bars – Design of thickness of rigid pavement by IRC method.

Text Books :

1. C.E.G. Justo and S.K. Khanna, *Highway Engineering*, Nemchand& Bros, Roorkee.
2. Venkataramaiah C, *Transportation Engineering Vol. I & Vol. II*, Universities Press.
3. L.R. Kadiyali, *Traffic Engineering and Transportation Planning,* Khanna Purblishers
4. G.V. Rao, *Principles of Transportation and Highway Engineering*, Tata McGrew Hill

Reference Books :

1. Jotin Khisty, *Introduction to Transportation Engineering*, Prentice Hall Publications.

2. L.R. Kadiyali, *Principles of Highway Engineering*, Khanna Publications.

3. S.K. Sharma, *Principles, Practice and design of Highway Engineering*, Prentice Hall Publications, New Delhi.

Web References:

1. https/www.coursera.org
2. www.nptel.ac.in/courses

Question Paper Pattern:

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End Exam: The question paper for end examination is for 60 marks. It shall consist of Five Units, each containing Two Questions (EITHER / OR type) from each unit of the syllabus, with a weightage of 12 marks. Each of these questions may contain sub-questions. The student shall answer one question from each unit.

HYDRAULICS & HYDRAULIC MACHINERY (HHM)

IV Semester :CE							Scheme : 2020
Course Code	Category	Hours/Week			Credits	Maximum Marks	
CE212	PCC	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		2	1	-	3	40	60	100
Sessional Exam Duration : 1.5 Hrs						End Exam Duration: 3 Hrs	

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

CO1: Determine the dimensions of most economical sections for open channel.

CO2: Understand the flow characteristics of open channel with respect to types of flows.

CO3: Analyze the characteristics of surface profiles and hydraulic jump in open channel.

CO4: Determine work done and efficiency and evaluate the performance of turbines and pumps.

CO5: Understand the working principles of turbines and pumps.

CO6: Understand the concept of unit quantities and specific quantities for pumps and turbines.

UNIT – I

Basics of Flow in Open Channels: Introduction – Differences between pipe flow and open channel flow – Types of flow in channels – Geometrical properties of channel section – Velocity distribution in channel section.

Uniform Flow in *Open Channels:* Chezy's and Manning's formulae – Most economical section of channels – Rectangular, trapezoidal, triangular and circular shapes.

UNIT - II

Critical Flow: Specific energy – Critical depth – Momentum in open channel flow –Specific force – Critical flow and its computation – Froude number – Determination of meanvelocity of flow in channel.

Non – Uniform Flow in Open Channels (GVF): Gradually varied flow – Dynamic equation– Classification and characteristics of surface profiles – Concept of channel transition.

Non – Uniform Flow in Open Channels (RVF): Rapidly varied flow – Specific force – Hydraulic jump – Types – Jump in rectangular channels – Loss of Energy – Applications.

UNIT – III

Basics of Fluid Machinery: Impact of free jets – Force exerted by fluid jet on stationary and moving plates – Flat, inclined and curved vanes – Velocity triangles at inlet and outlet of the vane – Angular momentum equation – Evaluation of torque exerted on a wheel with curved vanes.

Basics of Hydropower: Elements of hydroelectric power plants – Heads and efficiencies of turbines – Classification of turbines.

UNIT – IV

Hydraulic Turbines: Pelton wheel – Main components and working principle, Expressions for work done and efficiency, Working proportions and design – Radial flow reaction turbines – Modern Francis turbine – Work done and efficiency, Working proportions and design – Draft tube theory – Kaplan turbine – Working proportions.

Performance of Turbines : Performance under unit head – Unit quantities – Performance under specific conditions – Specific speed – Expressions for specific speed – Performance characteristic curves – Cavitation in turbines – Selection of turbines – Governing of turbines – Runaway speed.

UNIT - V

Hydraulic Pumps: Principle – Classification – Types – Centrifugal pumps, Reciprocating pumps, Submersible pumps.

Centrifugal Pumps: Components and working of a centrifugal pump – Work done by the impeller– Heads and efficiencies – Net positive suction head (NPSH). Priming – Minimum starting speed – Multistage pumps – Pumps in series and parallel –Limiting suction head – Cavitation – Expression for specific speed – Performance characteristics.

Reciprocating Pumps: Main components – Working of a Reciprocating Pump – Work done by single acting and double acting pumps – Coefficient of discharge, slip, percentage slip – Negative slip – Acceleration head – Indicator diagrams – Air vessels – Operating characteristics.

Text Books

1. P.N. Modi& S.M. Seth, *Hydraulics and Fluid Mechanics including Hydraulic Machines*, Standard Book House, New Delhi.

2. R.K. Rajput, *Fluid Mechanics and Hydraulic machinery*, S.Chand& Co., New Delhi.

3. R.K.Bansal, *Fluid Mechanics and Hydraulic machinery*, Laxmi Publications (P) Ltd.

4. K. Subramanya, *Flow in open channels*, Tata McGraw Hill Publishing Co. Ltd, New Delhi.

Reference Books

1. R.S. Varshney, *Hydro Power Structures*, Nem Chand Bros Publishers.

2. Jagadish Lal, *Fluid Mechanics and Hydraulics with computer Applications*, Metropolitan Book Company Pvt. Ltd.

3. C.M. White, *Fluid Mechanics*, McGraw Hills Publications.

4. Ven Te Chow, *Open channel Hydraulics*, Tata McGraw Hill Publishing Co. Ltd., New Delhi.

Question Paper Pattern:

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End Exam: The question paper for end examination is for 60 marks. It shall consist of Five Units, each containing Two Questions (EITHER / OR type) from each unit of the syllabus, with a weightage of 12 marks. Each of these questions may contain sub-questions. The student shall answer one question from each unit.

MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTACY (MEPA)

IV Semester : **Common for CE and EEE**					Scheme : 2020		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
HU201	**HSMC**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Sessional Exam Duration : 1.5 Hrs					**End Exam Duration: 3 Hrs**		

Course Outcomes : At the end of the course the student will be able to
CO1: Understand the nature and scope of managerial economics and the concepts of demand analysis.
CO2: Understand the significance of demand elasticity and the concepts of demand forecasting.
CO3: Understand the concepts of production and cost analysis and different market structures and their competitive situations.
CO4: Understand the concept and significance of capital budgeting.
CO5: Understand the principles and significance of accountancy and preparation of final accounts.

UNIT – I
Introduction to Managerial Economics & Demand :
Managerial Economics – Definition, Nature and Scope; Demand –Meaning, Types of Demand, Demand Determinants, Law of Demand and its exceptions, Law of Diminishing Marginal Utility, Indifference curve.

UNIT - II
Elasticity of Demand and Demand Forecasting:
Elasticity of Demand – Types, Measurement and Significance.
Demand forecasting – Importance, Factors, Purposes, Methods of Demand Forecasting.

UNIT – III
Theory of production & cost analysis and Market Structures:
Production Analysis: Meaning, Isoquants & Isocosts, The law of diminishing Marginal Returns, Law of Returns to Scale, Internal and External Economies of scale, Optimum combination of inputs and Producer's equilibrium.
Cost Analysis: Cost concepts, Cost output relationship for Short Run and Long Run, Break Even Analysis – Its Importance, Limitations and Managerial uses.
Market Structures: Types and Features of different market structures – Perfect Competition – Monopoly – Monopolistic and Oligopolistic; Price output determination in case of perfect competition and Monopoly.

UNIT – IV

Capital and Capital Budgeting:

Introduction; Definition; Significance of Capital Budgeting; Complications involved in capital budgeting decisions; Need for capital budgeting decisions; steps in capital budgeting; Methods of Capital budgeting – Traditional methods – Payback period and Accounting rate of return methods, Discounted Cash flow methods – Net present value method, Internal Rate of return method and Profitability index method.

UNIT - V

Introduction to Financial Accountancy:

Principles of Accountancy: Introduction, Double Entry System of Book Keeping-, Journal, Ledger, Preparation of Trial balance

Preparation of Final Accounts: Trading Account, Profit & Loss Account, and Balance Sheet with adjustments, Final Accounts problems.

Text Books

1. A.R. Aryasri, *Managerial Economics and Financial Analysis*, McGraw Hill Education.
2. Varshiney and Maheswari, *Managerial Economics*, Sultan Chand & Co, New Delhi.

Reference Books

1. Vanita Agarwal, *Managerial Economics*, Pearson Education.
2. Domnick Salvatore, *Managerial Economics in a Global Economy*, 4th Edition, Thomson.
3. S.P.Jain and K.L.Narang, *Financial Accounting*.

Question Paper Pattern:

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End Exam: The question paper for end examination is for 60 marks. It shall consist of Five Units, each containing Two Questions (EITHER / OR type)from each unit of the syllabus, with a weightage of 12 marks. Each of these questions may contain sub-questions. The student shall answer one question from each unit.

GEOGRAPHICAL INFORMATION SYSTEMS LAB [GIS(P)]

IV Semester : CE						Scheme : 2020
Course Code	Category	Hours / Week			Credits	Maximum Marks
CE213	PCCL	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		-	-	3	1.5	40	60	100
						End Exam Duration : 3 Hrs		

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

CO1: Understand the spatial and non-spatial data, raster and vector data

CO2: Digitize point, polyline and polygon features

CO3: Manage the attribute data

CO4: Build a model and perform spatial analysis using clip, buffer, overlay and selection tools

CO5: Prepare high quality maps

*Introduction***:** Investigation of geographic information systems (GIS) including theory and applications areas. A major portion of the course will be based on use of a current widely-used GIS computer software system. Aspects of geographic data entry and editing, spatial analysis, and map development and display will be considered.

List of Experiments

1. Georeferencing a Toposheet

2. Digitization of a Toposheet

3. Image to Map Registration

4. a) Adding X,Y data
   b) Join and Relate

5. Attribute data management

6. Usage of analysis tools to perform vector data analysis

7. Spatial analysis

8. Model Builder

9. Raster processing (Mosaic and clip)

10. Map Layout

Reference Books :

1. Kang Tsung Chang, *Introduction to Geographic Information Systems*, McGraw Hill, India

2. Anji Reddy, *Textbook of Remote Sensing and Geographical Information Systems*, BS Publications, Hyderabad.

TRANSPORTATION ENGINEERING LAB [TE(P)]

IV Semester : CE					Scheme : 2020		
Course Code	Category	Hours / Week			Credits	Maximum Marks	
CE214	PCCL	L	T	P	C	Continuous Internal Assessment	End Exam	Total
		-	-	3	1.5	40	60	100
						End Exam Duration : 3 Hrs		

Course Outcomes: The student shall be able to
CO1: Determine the properties of aggregates and bitumen
CO2: Determine the Marshall stability and flow value of bitumen mix
CO3: Determine and report the traffic volume and speeds of vehicles of a given stretch
CO4: Develop skills to analyze and interpret the experimental data.
List of Experiments
Tests on Aggregate
1. Determination of strength of the aggregate by crushing test using compression testing machine.
2. a) Determination of toughness value of aggregate by impact test.   b) Determination of water absorption value of aggregate by using water absorption test.
3. Determination of flakiness index and elongation index by shape test using thickness gauge and length gauge.
Tests on Bitumen
4. a) Determination of grade of bitumen by penetration test using penetrometer.   b) Determination of stripping value of aggregate by using stripping value test.
5. a) Determination of ductile value of bitumen using ductility testing machine.   b) Determination of softening value of the bitumen using ring and ball test.
Field Studies
6. Determination of traffic volume on selected stretch.
7. Determination of instantaneous speed of vehicles on selected stretch.
Demonstration
8. Determination of hardness property of aggregate using Los Angeles Abrasion Test.
9. Determination of Stability and flow value of bitumen mix using Marshall Stability Test.
10. Determination of extraction of bitumen from bitumen mix using bitumen extraction Test.

FLUID MECHANICS LAB [FM(P)]

IV Semester : CE					Scheme : 2020		
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	Continuous Internal Assessment	End Exam	Total
CE215	PCCL	-	-	3	1.5	40	60	100
						End Exam Duration : 3 Hrs		

Course Outcomes: At theend of the course the students will be able to

CO1: Measure the rate of flow through tanks using Orifice and Mouthpiece.

CO2: Measure the rate of flow in channels using Rectangular and Triangular Notch.

CO3: Measure the rate of flow in pipes using Venturimeter / Orificemeter.

CO4: Calculate the loss of head due to friction in a given pipe.

CO5: Calculate the loss of head due to minor losses in pipe line.

List of Experiments

1. Determination of coefficient of discharge, velocity and contraction for a small orifice by Constant head method.

2. Determination of coefficient of discharge of an external mouthpiece by Constant head method.

3. Determination of coefficient of discharge of a rectangular notch.

4. Determination of coefficient of discharge of a triangular notch.

5. Determination of coefficient of discharge of Venturimeter.

6. Determination of coefficient of discharge of Orificemeter.

7. Determination of friction factor for a given pipe.

8. Determination of loss coefficient in pipe lines due to bends and elbows (Minor losses).

9. Determination of loss coefficient in pipe lines due to sudden contraction and sudden expansion (Minor losses).

10. Verification of Bernoulli's equation.

ADVANCED SURVEYING LAB [ASUR(P)]

IV Semester : CE					Scheme : 2020		
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**	
SCCE01	**Skill oriented Course**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exam**	**Total**
		1	**-**	**2**	**2**	**40**	**60**	**100**

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

CO1: Understand the applications of advanced surveying instruments and methods.

CO2: Relate the knowledge of surveying to the modern instruments and methods.

CO3: Understand the applications of total station.

CO4: Gain the skill and field knowledge using DGPS.

CO5: Learn the application of E survey software.

List of Experiments

1. Perform different built-in application programmes using Total Station

2. Data collection using Total Station

3. Stake-out using Total Station

4. Post processing of data obtained from Total Station

5. Curve setting using Total Station

6. Setting out a building using Total Station

7. Static Survey Using DGPS

8. Real Time Kinematic Survey Using DGPS

9. Post processing of data obtained from DGPS

10. Basics and applications of E-survey CADD & E-Survey sections.