Second Year B. Tech. (Civil Engineering)-Semester III									
Course Code	**Course Title**	**L**	**T**	**P**	**C**	**Evaluation Scheme**			
						Compone nt	**Exam**	**WT (%)**	**Min. Pass %**
CET201R1 (BS|SS) Version:1.0	Differential Equations & Probability	3	1	-	4	Theory (100)	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
CET202R1 (ES|ST) Version:1.0	Fluid Mechanics	3	-	-	3	Theory (100)	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
CET203R1 (PC|ST) Version:1.0	Building Materials & Construction	2	-	-	2	Theory (100)	FET	20	40
							CAT	30	
							ESE	50	40
CET204 R1 R1(PC|ST) Version:1.0	Engineering Surveying	3	-	-	3	Theory (100)	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
CET205 R1 R1(PC|ST) Version:1.0	Structural Mechanics	3	-	-	3	Theory (100)	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
CET206 R1 R1(PC|SS) Version:1.0	Concrete Technology	3	-	-	3	Theory (100)	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
CET207 R1 R1(ES|ST) Version:1.0	Fluid Mechanics Lab	-	-	2	1	Practical	FET	100	40
CET208R1 (PC|ST) Version:1.0	Building Drawing Lab	-	-	2	1	Drawing	FET	100	40
CET209 R1(PC|ST) Version:1.0	Surveying Lab	-	-	2	1	Practical	FET	50	40
							ESE	50	40
CET210R1 (PC|ST) Version:1.0	Cement Concrete Lab	-	-	2	1	Practical	FET	50	40
							ESE	50	40
CET211R1 (PC|ST) Version:1.0	Professional Development Skill I	-	-	2	N C	Practical			
		17	**1**	**10**	**22**	Total Hours:**28**, Total Credits:**22**, Audit: **-**			

FET – Faculty Evaluation Test; **CT – Class** Test; **ESE –** End Semester Examination; **ISE –** In semester Evaluation; **POE -** Practical Oral Examination; **EOE –** External Oral Examination

Second Year B. Tech. (Civil Engineering)-Semester IV								
Course Code	Course Title	L	T	P	C	Evaluation Scheme		
						Component	Exam	WT (%)	Min. Pass %
CET212R1 **R1**(ES|SS) Version:1.0	Water Resource Engineering	3	-	-	3	Theory (100)	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
CET213 R1 **R1**(PC|ST) Version:1.0	Transportation Engineering - I	3	-	-	3	Theory (100)	FET	20	40
							CATI	15	
							CAT II	15	
							ESE	50	40
CET214 R1 **R1**(PC|ST) Version:1.0	Building Planning and Drawing	2	-	-	2	Theory (100)	FET	20	40
							CAT	30	
							ESE	50	40
CET215 R1 **R1**(ES|ST) Version:1.0	Project Management & Engineering Economics	3	-	-	3	Theory (100)	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
CET216 R1 **R1**(PC|ST) Version:1.0	Structural Analysis – I	3	-	-	3	Theory (100)	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
CET217 R1 **R1**(PC|SS) Version:1.0	Soil Mechanics	3	-	-	3	Theory (100)	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
CET218R1 (PC|ST) Version:1.0	Material Testing Lab	-	-	2	1	Practical	FET	100	40
CET219 R1 **R1**(PW|ST) Version:1.0	Mini Project - I	-	-	2	1	Project	FET	100	40
CET220 R1 **R1**(PC|ST) Version:1.0	Soil Mechanics Lab	-	-	2	1	Practical	FET	50	40
							ESE	50	40
CET221 R1 **R1**(PC|ST) Version:1.0	Building Planning Lab	-	-	2	1	Drawing	FET	50	40
							ESE	50	40
CET222 R1 **R1**(PC|ST) Version:1.0	Professional Development Skill II	-	-	2	-	Practical			
CET223 R1 **R1**(PC|ST) Version:1.0	Environmental Science	1	-	2	-				
		17	**-**	**12**	**21**	Total Hours:**29**, Total Credits:**21**, Audit: **-**			

FET – Faculty Evaluation Test; **CT – Class** Test; **ESE –** End Semester Examination; **ISE –** In semester Evaluation; **POE -** Practical Oral Examination; **EOE –** External Oral Examination

S. Y. B. Tech. Civil Engineering

Semester III

S. Y. B. Tech. Civil Engineering

Semester IV

CET201R1 Differential Equations &Probability

(Ver 1.0, Basic Science, School of Science)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min Pass (%)	
3	1	-	4	Theory (100)	FET	20	40	40
					CAT-I	15		
					CAT-II	15		
					ESE	50	40	

Course Description: This course is at odd semester of Second Year B Tech Technology for Civil Engineering. It is a foundation course in Analysis and Probability Distribution and may be pre-requisites for other courses. It covers solution of differential equation, Fourier series, vector differentiation, Probability distribution and complex integration.

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

CO201.1: **Solve**[3] LDE with constant coefficients.

CO201.2: **Solve**[3] Partial Differential Equations.

CO201.3: **Represent**[4] periodic function as a Fourier series.

CO201.4: **Find**[2] Divergence, Gradient, Curl of a vector point function, Probability Distribution and **Evaluate**[4] Complex Integration

Syllabus (Theory)

Units	Description	Hours
I	Linear Differential Equations (LDE): Linear Differential Equations with constant coefficients Definition, Complementary function and Particular integral (without method of variation of Parameters), Homogeneous Linear differential equations	7
II	Partial Differential. Equations, Four standard forms of PDE of first order.	7
III	Fourier Series: Definition, Euler's Formulae, Dirichlet's Condition. Functions having points of discontinuity, Change of interval, Expansion of odd and even periodic functions, Half range series	7
IV	Vector Differential Calculus. Differentiation of vectors, Gradient of scalar point	7

	function, Directional derivative, Divergence of vector point function, Curl of a vector point function. Irrotational and solenoidal vector field.	
V	Probability distribution: Random variable, Binomial Distribution, Poisson Distribution, Normal Distribution.	7
VI	Calculus of complex functions. Functions of complex variable, Analytic function, necessary and sufficient conditions for f(z) to be analytic (without proof), Cauchy-Riemann equations in polar coordinates (without Proof). Milne- Thomson method to determine analytic function f(z). Harmonic function. Complex integration, Cauchy's theorem and Cauchy's integral formula (without proof)	7

Text Book

- P. N. Wartikar& J. N. Wartikar A text book of Applied Mathematics, Vol.-I, II, III, Pune VidyarthiGrihaPrakashan, Pune.

References

- Dr. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Delhi.
- Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India Pvt. Ltd.
- H. K. Das, Advanced Engineering Mathematics, S. Chand Publication
- Kanti B. Datta, Mathematical methods of Science and Engineering, Cengage Learning
- V. Sundaram, Engineering Mathematics, Vikas Publication
- Merle C. Potter, Advance Engineering Mathematics, Oxford University Press

CET 202R1 Fluid Mechanics

(Ver 2.0, Program Core, School of Technology)							
Lecture	**Tutorial**	**Practical**	**Credits**	**Evaluation Scheme for (Theory and Practical)**			
				Component	Exam	WT	Pass %
3	1	-	4	Theory (100)	FET	20	40
					CAT I	15	
					CAT II	15	
					ESE	50	40

Course Description: This course is about fluid and its properties. Fluid statics will be dealt with detail. Pre-requisites for this course are courses from mathematics and engineering mechanics. This course also deals with open channel hydraulics.

Pre-requisite: Engineering mechanics, engineering mathematics I, II and III.

Course Outcomes: after the end of this course students will able to

CET202.1	Recognize[2] the processes and science of fluids, Explain[2] the basic properties of fluids and their behavior under application of various force systems
CET202.2	Discuss[2] the basic concepts and principles in fluid statics, fluid kinematics and fluid dynamics with their applications in fluid flow problems
CET202.3	Explain[2] the concept of Open channel flow, concept of rapidly varied flow & hydraulic jump
CET202.4	Demonstrate[2] application of various types of turbines and pumps

Course contents

Units	Description	Hours
I	**Basic properties of fluids:** Physical Properties of Fluids, Newtons law of viscosity, Types of Fluids. **Fluid Statics:** Types of Pressure, Pascal's Law, Hydrostatic Law, Pressure Measurement Devices, Pressure Head, Pressure Diagram, Centre of	7

	Pressure, Forces on Plane and Curved Surfaces, introduction to buoyancy and floatation	
II	**Fluid Kinematics:** Types of Flows, Stream lines, Equipotential lines, Steak Line, Path Line, Stream Tube, Stream Bundle, Stream Function and Velocity Potential Function, Flow Net- (Properties and Uses), Continuity Equation (3-D Cartesian Form only). **Fluid Dynamics:** Forces Acting on Fluid in Motion, Euler's Equation along a Streamline, Bernoulli's Theorem, Limitations. Bernoulli's Applications: Venturimeter (Horizontal and Vertical), Orificemeter, Pitot tube, Orifices, Concept of HGL and TEL	7
III	**Laminar and Turbulent Flow:** Reynold's Experiment, Darcy-Wiesbach Equation, Hazen Poisulle's Equation, Introduction to Moody's Chart and Nomograms. Minor losses in pipes, concept of equivalent pipe, Dupit's Equation, introduction to siphon.	7
IV	**Uniform flow through open channel:** Introduction, Difference between Pipe Flow and Open Channel Flow, Types of Open Channels, Types of Flows In Open Channel, Geometric Elements, Velocity Distribution, Steady and Uniform Flow: Chezy'sand Manning's Formula, Uniform Flow Computations, Hydraulically Efficient Section (Rectangular, Triangular, Trapezoidal) Depth Energy Relationship in Open Channel Flow: Specific Energy (Definition and Diagram, Critical, Sub-Critical, Super-Critical Flow), Specific Force (Definition and Diagram)	7
V	**Gradually Varied Flow (GVF) and Rapidly Varied Flow (RVF):** Definition, Classification of Channel Slopes, Dynamic Equation of GVF (Assumption and Derivation), Classification of GVF Profiles- Practical Examples, Direct Step Method of Computation of GVF Profiles	7

VI	**Notches and Weirs**: Types, Discharge Equation, Velocity of Approach, Francis Formula, Errors in Measurement of Discharge, Sharp, Broad and Round Crested Weirs.	7
	Impact of Jet: Impact of Jet: Impulse Momentum Principle, Impact of Jet on Vanes- Flat, curved (Stationary and Moving)	
	Pumps and Turbines: Classification of Turbines- Pelton, Francis and Kaplan Turbine, Definitions of unit Quantities, specific speed, selection of type of Turbine, Concept of Draft Tube.	

Text Books

1 Modi. P. M. and Seth S. N., "Fluid mechanics & hydraulics", 10th Edition, Standard Publications (2015).

2 R. K. Bansal, "Fluid mechanics & hydraulics", 14th Edition, Khanna publications (2009).

References

1 A. K. Jain, "Fluid Mechanics" 2nd Edition, Khanna Pub., Delhi (2015).

2 Garde R. J. and Mirajgaonkar A. G., Engineering Fluid Mechanics, Tata Mcgraw Hill.

3 R. J. Garde, Fluid Mechanics Through Problems, Tata Mcgraw Hill

4 Rangaraju, "Open Channel flow", Tata McGraw-Hill Pub. Co., Delhi

5 Streeter, "Fluid Mechanics", McGraw-Hill International Book Co., Auckland

6 K. L. Kumar, "Fluid Mechanics", Eurasia Publication House, Delhi

CET 203 R1 Building Material & Construction

Lecture	Tutorial	Practical	Credits	Evaluation Scheme for (Theory and Practical)			
				(Ver 2.0, Program Core, School of Technology)			
				Component	Exam	WT	Pass %
2	-	-	2	Theory (100)	FET	20	40
					CAT I	15	
					CAT II	15	
					ESE	50	40

Course Description: Fundamentals of building construction methods and materials of construction. The approach is to study the stability of buildings and materials under fire conditions. The emphasis is upon safety under fire conditions and the technology of limiting fire spread in new and existing buildings

Course Outcomes: after the successful completion of course, students will able to

CET203.1   **Understand[2]** properties and application of construction materials

CET203.2   **Identify[2]** and select appropriate roofs, flooring for buildings

CET203.3   **Select[3]** appropriate openings and mode of vertical movements and Design[4] of staircase

CET203.4   **Understand[2]** various building components and construction activities

Units	Course Content	
	Description	**Hours**
I	**Building Materials:** Classification of Building materials, requirements of building materials and products, functional, aesthetical and economic. Study of properties of materials: physical (Bulk density, Density porosity, Durability, Specific gravity, Weathering Resistance) mechanical (Strength, Hardness, Elasticity, Plasticity, Brittleness, Fatigue, Creep) chemical (Chemical resistance, Corrosion resistance) aesthetical and other complex	5

	properties like durability, reliability, compatibility, and economic characteristics.	
II	**Masonry** Definition and terms used in masonry. Brick masonry, characteristics and requirements of good brick masonry, Bonds in brick work, Header, Stretcher, English, Flemish bond, Stone masonry, Requirements of good stone masonry, Classification, characteristics of different stone masonry, Joints in stone masonry.Composite masonry. Types of walls: load bearing, partition walls, cavity walls.	5
III	**Surface Finishes-Plastering and Pointing**: purpose, materials and methods of plastering and pointing, defects in plastering-Stucco plastering, lathe plastering **Damp proofing-** causes, effects and methods. **Paints-** Purpose, types, ingredients and defects, Preparation and applications of paints to new and old plastered surfaces, wooden and steel surfaces.	5
IV	**Floors and Roofs:** Floors: Requirement of good floor, Components of ground floor, Selection of flooring material, Laying of Concrete, Mosaic, Marble, Granite, Tile flooring, Cladding of tiles. **Roof;** -Requirement of good roof, Types of roof, Elements of a pitched roof, Trussed roof, Different roofing materials, R.C.C. Roof. **Lintels and Arches**: Definition, function and classification of lintels, Balconies, chejja and canopy**. Arches**; Elements and Stability of an Arch.	5
V	**Doors, Windows and Ventilators:** Location of doors and windows, technical terms, Materials for doors and windows, Paneled door, Flush door, Collapsible door, rolling shutter, PVC Door, Paneled and glazed Window, Bay Window, French window. Ventilators. Sizes as per IS recommendations **Stairs:** Definitions, technical terms and types of stairs, Requirements of	5

	good stairs. Geometrical design of RCC stairs.	
VI	**Components of Building:** Basic requirements of a building as a whole: strength and stability, Dimensional stability, comfort and convenience, damp prevention, water-proofing techniques, heat insulation, day lighting and ventilation. Components of Building, Area considerations, Construction Principle and Methods for layout, **Foundation**-Preliminary investigation of soil, safe bearing capacity of soil, Function and requirements of good foundation, types of foundation, introduction to grillage, spread, combined, strap, mat and pile foundation	5

Text Book

1 Engineering Materials, Rangwala, Charotar Publication
2 Basic Civil Engineering, G. K. Hiraskar (DhanpatRai Publications)
3 Materials of Construction, Ghosh, Tata McGraw Hill Publications.
4 S.K. Duggal, "Building Materials", (Fourth Edition) New Age International (P) Limited, 2016
5 Building Construction, S.P. Arora, S.P. Bindra (DhanpatRai Publications)

References

1 SP 7- National Building Code Group 1 to 5- B.I.S. New Delhi
2 I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings
3 Handbook of Building Construction- M. M. Goyal (Amrindra Consultancy (P) Ltd.)

CET 204 R1 Engineering Surveying

Lecture	Tutorial	Practical	Credits	Evaluation Scheme for (Theory and Practical)			
			(Ver 2.0, Program Core, School of Technology)				
				Component	Exam	WT	Pass %
3	-	-	3	Theory (100)	FET	20	40
					CAT I	15	
					CAT II	15	
					ESE	50	40

Course Description: The focus will be very much on Calculate, design and layout horizontal and vertical curves, Understand, interpret, and prepare plan, profile, and cross-section drawings, Work with cross-sections and topographic maps to calculate areas, volumes, and earthwork quantities. Operate a total station to measure distance, angles, and to calculate differences in elevation.

Pre-requisite: Elements ofCivil Engineering

Course Outcomes: after the end of this course students will able to

CET204.1   **Apply**[2] the knowledge of leveling and contouring on field

CET204.2   **Apply**[2] the knowledge of theodolite in surveying

CET204.3   **Correlate**[3] the tacheometric concept of surveying with practical implementation

CET204.4   **Apply**[2] the knowledge of trignometrical leveling and Setting out of curves

	Course contents	
Unit	Description	Hours
I	**Levelling and contouring:** Instruments for leveling, adjustment of leveling reciprocal leveling , sensitivity of bubble tube, Contouring, characteristics of contours, contours of natural features, methods of contouring, interpolation, contour gradient, contour maps.	07
II	**Theodolite survey and traversing:** Theodolite component parts, classification, measurements of angles, application of theodolite	07

	observations, traversing, field work, traverse computations.	
III	**Tacheometric surveying:** Instruments, principle of tacheometry, methods of tacheometry, tacheometric tables, reduction diagram, tacheometry as applied to subtense measurement, field work for tacheometric surveying.	07
IV	**Trigonometrical surveying:** Base of the object accessible, base of an inclined object accessible, reduced level of the elevated points with inaccessible bases, instrument axes at different levels.	07
V	**Curve setting:** Types of curves, elements of a curve, setting out a simple curve, setting out a compound curve, super elevation, types of vertical curves, setting out vertical curves,	07
VI	**Modern field survey systems:** Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories –Advantages and Applications.	07

Text Book

1 Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.

References

1 Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.

2 Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011

3 Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010

4 Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.

5 Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 2001.

CET205 R1 Structural Mechanics

(Ver 1.0, Program Core, School of Technology)

Lecture	Tutorial	Practical	Credits	Evaluation Scheme for (Theory and Practical)			
				Component	Exam	WT	Pass %
3	-	-	3	Theory	FET	20	40
					CAT I	15	
					CAT II	15	
					ESE	50	40

Course Description: The focus will be very much on basic mechanical properties of various materials like mild steel, copper, aluminum, tor steel etc. Fundamental laws of elasticity, elastic constants, concept of stress and strain, stress concentration will be taught. Behavior of beams, shaft and cylinders under different kind of loadings will be also focused.

Course Outcomes: after the end of this course students will able to

CO205.1	explain the stress, strain and deformation of elastic bodies under external actions, understand the internal forces in the beams.
CO205.2	Explain the stresses and deformations of elastic bodies under flexure, explain stresses and deformations of elastic bodies under torsion.
CO2053	Discuss the stresses and strains on different planes,
CO205.4	Discuss the internal forces under moving loads

Syllabus (Theory)

Units	Description	Hours
I	**Simple stress and strain** Concept of simple stress and strain, Hooke's law, elastic behavior of the body under external actions, composite sections under axial loading, temperature stresses, elastic constants, normal stresses and strains in three dimensions.	7
II	**Shear force and bending moment diagrams**	7

		Shear force and bending moment diagrams for statically determinant beams for point loads, moments, uniformly distributed and uniformly varying loads, concept of point of contra flexure.	
III		**Torsion of circular shaft and thin cylinders**	7
		Assumptions in torsion theory, torsion formula, polar moment of inertia, analysis of circular shafts subjected to torsion, power transmitted. Circular shaft subjected to bending and axial thrust.Analysis of thin walled cylinder.	
IV		**Bending stress distribution in Beams**	7
		Bending stresses in beams - Assumptions in pure bending, bending formula, and moment of resistance, Stress distribution diagrams for rectangular, round, L and T shape beams etc.	
V		**Shear stress distribution in beams**	7
		Shear stress equation, Stress distribution diagrams for rectangular, round, L, T and triangular shape beams etc.	
VI		**Strain Energy in beams and trusses**	7
		Strain energy due to different types of actions, impact loading. Strain energy method for deflection of determinate beams, bents and trusses	

Text Book

- "Mechanics of Structure" (Vol. I and II) - Junnarkar S.B. and Advi, CharotarPublication.
- "Mechanics of Materials" - R.C. Hibbler, Pearson Education.

References

- "Mechanics of Materials" - Gere and Timoshenko, CBS publishers.
- "Mechanics of Materials" Vol I and II - Punmia, Jain, Laxmi Publications.
- "Strength of Materials" - S Ramamrutham, Dhanapat Rai Publications.
- "Strength of Materials" - Bhavikatti S.S., New Age Publications.
- "Strength of Materials" - R.K.Bansal, Laxmi Publications.
- "Structural Analysis" - Bhavikatti S.S, Vikas Publications house New Dehli

CET 206 R1 Concrete Technology

Lecture	Tutorial	Practical	Credits	Evaluation Scheme for (Theory and Practical)			
				Component	Exam	WT	Pass %
3	-	-	3	Theory (100)	FET	20	40
					CAT I	15	
					CAT II	15	
					ESE	50	40

(Ver 2.0, Program Core, School of Technology)

Course Description: Concrete types and practical application. Selection of concrete mix proportions, fresh concrete properties. Cement types and their properties, pozzolanic additives, properties of the binder phase. Properties of aggregates and their influence, types and use of admixtures. Curing technology and shrinkage/crack sensitivity.

Course Outcomes: after the end of this course students will able to

CET206.1	determine the properties of concrete ingredients i.e. cement, fine aggregate and coarse aggregate.
CET206.2	list out the various process involved to produce good quality of concrete, list out the types of concrete admixture and decide the suitable admixture for specific purpose
CET206.3	determine the mechanical properties of concrete i.e. compressive, tensile, flexural etc., understand the durability factors requirements of concrete
CET206.4	decide suitable concrete for different structures considering the prevailing weathering conditions

	Syllabus	
Units	**Description**	**Hours**
I	**Concrete materials:Cement** - Ordinary Portland, Portland Pozzolana, chemical composition, grade of cement, hydration, tests for cement: fineness, soundness, compressive strength, setting time. **Aggregates** - classification, requirements, size, shape, texture, Tests for	7

	coarse aggregates: specific gravity, grading of aggregate, Flakiness index, Elongation Index, Impact value, abrasion value, crushing value. Tests for fine aggregates: specific gravity, sieve analysis, fineness modulus, bulking of sand,		
II	**Fresh Concrete:** Workability, factors affecting, measurement of workability, different tests for workability, segregation, bleeding, process of manufacture of concrete -batching, mixing, transportation, compaction, curing of concrete, curing method.	7	
III	**Admixtures in concrete** - air entraining agents, plasticizer and super plasticizer, accelerators, retarders, workability agents. Mineral admixtures: fly ash, silica flumes, Ground Glass Blast Furnace Slag, Metakoline.	7	
IV	**Hardened Concrete:** Strength of concrete, w/c ratio, gel/space ratio, gain of strength with age, maturity concept of concrete, effect of maximum size of aggregate on strength, Test on hardened concrete - flexural strength, comparison of cube test and cylinder test, Schmidt's rebound hammer, Ultrasonic pulse velocity method.	7	
V	**Durability of concrete:** Strength and durability relationship, effect of w/c on durability, different exposure condition as per IS 456 minimum and maximum cement contents, effect of permeability, sulphate attack, methods of controlling sulphate attack.	7	
VI	**Special Concrete:** Light weight concrete, no-fines concrete, high density concrete, fiber reinforced concrete, self-compacting concrete, high strength concrete, high performance concrete, cold weather concreting, hot weather concreting, pavement quality concrete.	7	

Text Books

1 Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995

2 Shetty M. S, "Concrete Technology", S. Chand and Company Ltd, New Delhi, 2003

References

1 Santhakumar. A.R; "Concrete Technology", Oxford University Press, New Delhi, 2007

2 Gupta B. L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010.

3 Gambir. M.L; "Concrete Technology", 3rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi.

CET 207 R1 Fluid Mechanics lab

(Ver 2.0, Program Core, School of Technology)							
Lecture	**Tutorial**	**Practical**	**Credits**	**Evaluation Scheme for (Theory and Practical)**			
				Component	Exam	WT	Pass %
-	-	2	1	Practical	ISE	50	40
					POE	25	

Course Outcomes: after the end of this course students will able to

CET207.1 Explain[2] the basic properties of fluids

CET207.2 Perform experiment on metacentric height

CET207.3 Demonstrate[3] the principles of continuity, momentum and energy by Bernoulli's theoram

CET207.4 Analyze[4] problems by making proper assumptions and learn systematic engineering methods

CET207.5 Establish[2] uniform flow in rectangular channel

CET207.6 Calibrate[2] notch and weir

Laboratory Work

The students are expected to perform following experiments and submit report of same;

1   Measurement of Discharge and Study of Pressure Measuring Devices

2   Verification of Bernoulli's Theorem

3   Calibration of Venturimeter and

4   Reynold's Experiment

5   Establishment of uniform flow in open channel

6   Calibration of V-Notch / Rectangular Notch

7   Study of Flow over Weirs

8   Impact of Jet

Text Book

1 Modi. P. M. and Seth S. N., "Fluid mechanics & hydraulics", 10th Edition, Standard Publications (2015).

2 R. K. Bansal, "Fluid mechanics & hydraulics", 14th Edition, Khanna publications (2009).

References

1 A. K. Jain, "Fluid Mechanics" 2nd Edition, Khanna Pub., Delhi (2015).

2 Garde R. J. and Mirajgaonkar A. G., Engineering Fluid Mechanics, Tata Mcgraw Hill.

3 R. J. Garde, Fluid Mechanics Through Problems, Tata Mcgraw Hill

4 Rangaraju, "Open Channel flow", Tata McGraw-Hill Pub. Co., Delhi

5 Streeter, "Fluid Mechanics", McGraw-Hill International Book Co., Auckland

6 K. L. Kumar, "Fluid Mechanics", Eurasia Publication House, Delhi

CET 208 R1 Building Drawing Lab

				Evaluation Scheme for (Theory and Practical)			
Lecture	**Tutorial**	**Practical**	**Credits**	Component	Exam	WT	Pass %
-	-	2	1	Practical (100)	FET	100	40
				-	-	-	-

(Ver 2.0, Program Core, School of Technology)

Course Description: Fundamentals of building construction methods and materials of construction. The approach is to study the stability of buildings and materials under fire conditions. The emphasis is upon safety under fire conditions and the technology of limiting fire spread in new and existing buildings

Pre-requisite: Basic civil Engineering

Course Outcomes: after the successful completion of course, students will able to

CET208.1   Understand[2] importance of drawing

CET208.2   Draw[2] various components of building as per scale

           Identify[2] and select appropriate openings and mode of vertical movements and

CET208.3   Design[3] of staircase

CET208.4   Co-relate[3] theoretical knowledge with field practice

Lab work

1   Lettering, Symbols, Types of lines and dimensioning as per IS 962

2   Drawing to a scale, draw on half imperial drawing sheet.

     A) Brick masonry: English bond, Flemish bond, rat trap bond.

     B) Stone Masonry: UCR, Course Rubble

     C) Doors: T.W. Paneled Door.

     D) Windows: T.W., Glazed and aluminum Window.

E) Design and drawing of staircases

F) Foundations: - Isolated, Combined Footing, Under Reamed Piles. (With reinforcement details)

3 Site visits (minimum two) and detailed report.

4 Report on market survey about building material

Text Book

1 Engineering Materials, Rangwala, Charotar Publication.

2 Basic Civil Engineering, G. K. Hiraskar (DhanpatRai Publications)

3 Materials of Construction, Ghosh, Tata McGraw Hill Publications.

4 Building Materials, S.K. Duggal, (Fourth Edition) New Age International (P) Limited, 2016

5 Building Construction, S.P. Arora, S.P. Bindra (DhanpatRai Publications)

References

1 SP 7- National Building Code Group 1 to 5- B.I.S. New Delhi

2 I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings

3 Handbook of Building Construction- M. M. Goyal (Amrindra Consultancy (P) Ltd.)

CET 209R1 Engineering Surveying Lab

Lecture	Tutorial	Practical	Credits	Evaluation Scheme for (Theory and Practical)			
(Ver 2.0, Program Core, School of Technology)							
				Component	Exam	WT	Pass %
-	-	2	1	Practical	FEP	50	40
					POE	50	40

Course Description: The focus will be very much on Calculate, design and layout horizontal and vertical curves, Understand, interpret, and prepare plan, profile, and cross-section drawings, Work with cross-sections and topographic maps to calculate areas, volumes, and earthwork quantities. Operate a total station to measure distance, angles, and to calculate differences in elevation.

Pre-requisite: Elements ofCivil Engineering

Course Outcomes: after the end of this course students will able to

CET209.1   **Apply**[3] the knowledge of leveling and contouring on field

CET209.2   **Apply**[3] the knowledge of theodolite in surveying

CET209.3   **Correlate**[3] the tacheometric concept of surveying with practical implementation

CET209.4   **Apply**[3] the knowledge of trignometrical leveling and Setting out of curves

Lab Work

Two hours per week per batch practical is to be utilized for (A) Term work shall consist of field surveying and leveling. It includes levelling and contouring, theodolite survey and traversing, tacheometric surveying and curve setting. (B) Term work shall include two minor projects on block contouring and traversing by using Theodolite/Total Station assigned by respective lab in-charge.

Expt No.	List of Experiment
1	Reciprocal leveling
2	Sensitivity of Bubble Tube
3	Measurement of Horizontal angle by different method
4	Measurement of vertical angle and height

5	Different application of theodolite
6	Grade of line by tacheometry and tangential method
7	Area of polygon by tacheometry and tangential method
8	Setting out different horizontal curve
9	Road Project by total station at least 500 m
10	Traversing by total station

Text Book

1   Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.

References

1   Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.

2   Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011

3   Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010

4   Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.

5   Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 2001.

CET 210R1 Cement Concrete Lab

				Evaluation Scheme for (Theory and Practical)			
Lecture	**Tutorial**	**Practical**	**Credits**	Component	Exam	WT	Pass %
-	-	2	1	Practical	ISE	50	40
					POE	25	

(Ver 2.0, Program Core, School of Technology)

Course Outcomes: after the end of this course students will able to

CET210.1 determine the properties of concrete ingredients i.e. cement

CET210.2 determine the properties of concrete ingredients i.e. fine and coarse aggregate.

CET210.3 evaluate properties of fresh concrete by using workability test

CET210.4 design optimize mix proportion of concrete by using ACI 211.1-91, IS 10262- 2009 methods

CET210.5 evaluate mechanical properties of harden concrete

CET210.6 evaluate properties of harden concrete by using NDT techniques

Laboratory Work

The students are expected to perform experiments listed given below and submit report of same;

1 **Test on Cement:** fineness, Standard Consistency, Setting Time, Compressive Strength and Soundness Test.

2 **Test on Aggregate:** Specific Gravity, Grading of Aggregate, Flakiness Index, Elongation Index, Impact Value, Abrasion Value, Crushing Value, Alkali Aggregate Reaction, Fineness Modulus, Bulking of Sand.

3 **Test on Fresh Concrete:** Slump, Vee-Bee, Compaction Factor and Flow Test.

4 **Concrete Mix Design:** Concrete mix design by ACI 211.1-91, IS 10262- 2009 and IS 456.

5 **Test on Hardened Concrete:** Split Tensile Test, Compressive Strength, Modulus of Rupture, Rebound Hammer Test and Ultrasonic Pulse Velocity.

Text Book

1 Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995

2 Shetty M. S, "Concrete Technology", S. Chand and Company Ltd, New Delhi, 2003

References

1 IS: 383 – specifications for fine & coarse aggregate from natural sources for concrete.

2 IS: 2386 – methods of tests for aggregate for concrete. (9 parts)

3 IS: 516 – 1959: Specification for compressive strength, Flexural strength

4 IS: 10262 – 2009: Recommended Guide Lines for Concrete Mix Design

CET 211R1 Professional Development - I

(Ver 1.0, Program Core, School of Technology)

For Sem-III of B. Tech (Common for All Branches)

Lect.	Tut.	Practical	Credits	Evaluation Scheme for (Th and Pr)			
				Component	Exam	WT	Pass
-	-	2	1		CAT I	-	
					CAT II	-	
					ESE	-	
				Pr (100)	TW	50	Min 50
					POE	50	

Course Description: This course aims to prepare the students for soft skills. The course will help them to understand their potential and set goals accordingly and organize their activities to achieve their set goals. The course also focuses on presentation and public speaking.

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

CO211.1   : apply[3] self analysis techniques

CO211.2   : plan[4] and execute SMART goals

CO211.3   : demonstrate[3] team building skills

CO211.4   : prepare time table and action plan to achieve set goals.

CO211.5   : exhibit[3] presentation and public speaking skills

Syllabus

Units	Description	Hrs
I	**Soft Skills:** What are soft skills? Importance of soft skills, selling your soft skills, identifying and improving your soft skills **Self Analysis:** Importance of knowing yourself, SWOT Analysis, Importance of Self Confidence, Self Esteem	04
II	**Goal Setting:** SMART Goals, Short Term goals, Moderate term goals, Long Term, Life Time Goals	04

III	**Team Building and Teamwork:** Introduction-meaning–aspects of team building, team Vs group, Stages of team building, Characteristics of effective team, role of a team leader, role of team members	04
IV	**Time Management:** Value of time, Diagnosing Time Management, Preparing to do list, Prioritizing work	04
V	**Presentation skills and Public Speaking:** Elements of an effective presentation, Structure of a presentation, Presentation tools, Audience analysis, Language: Articulation, Good pronunciation, Voice quality, Modulation, Accent and Intonation. Extempore and Prepared speeches	04

Note: During the practical sessions, it is expected that the contents of all modules should be delivered to the students of different batches and assignments be given based on the activities discussed as per the modules. Students must demonstrate the acquired skills by means of giving presentations, delivering public speeches, group discussions etc.

References:

1. Wallace & Masters, Personal development for Life & work, Thomson Learning.

2. Barun K. Mitra, Personality Development and Soft- Skills, Oxford University Press.

3. Fred Luthans, Organizational behavior, McGraw Hill.

4. Asa Don Brown, Interpersonal skills in the Workplace, Tate publishing and Enterprises.

Web links:

https://www.monster.com/career-advice/article/soft-skills-you-need
www.saddleback.edu/book/export/html/4405
https://www.wikijob.co.uk/content/interview-advice/competencies/soft-skills
http://www.indiabix.com/
https://www.edx.org/professional-certificate/ritx-soft-skills
https://www.bookmytrainings.com/soft-skills-trainings
www.softskillstraininggroup.com/
www.softskillsindia.com
www.niit.com/solution/soft-skill-training
https://www.skillsyouneed.com/interpersonal-skills.html

CET212R1 Water Resource Engineering

(Ver 2.0, Program Core, School of Technology)							
Lecture	**Tutorial**	**Practical**	**Credits**	**Evaluation Scheme for (Theory and Practical)**			
				Component	Exam	WT	Pass %
3	1	-	4	Theory (100)	FET	20	40
					CAT I	15	
					CAT II	15	
					ESE	50	40

Course Description: This course deals with hydrology along with ground water hydrology, irrigation patterns. It also studies runoff and floods. The course focuses on reservoir planning, water and land management.

Pre-requisite: Engineering mechanics, engineering mathematics I, II and III.

Course Outcomes: after the end of this course students will able to

CET212.1   **Explain**[2]hydrology of nature, **Recognize**[1] and summarize[2] irrigation pattern in India

CET212.2   **Discuss**[2]Ground Water Hydrology

CET212.3   **Explain**[2] runoff and floods

CET212.4   **Illustrate**[4] reservoir planning, **Categorize**[3] water management and land drainage

Course contents		
Units	**Description**	**Hours**
I	**Introduction of Hydrology:** Definition, hydrologic cycle, **Precipitation:** Forms and types of precipitation, Methods of measurement, **Evaporation:** Process, factors affecting, measurement, and control of evaporation, **Infiltration:** Process, Factors affecting and measurement of Infiltration. **Ground water hydrology:** Occurrence of ground water, Darcy's law, Hydraulics of well under steady flow conditions in confined and unconfined aquifers, constructional features of Tube wells and Open wells	07

II	**Runoff:** Factors affecting runoff, Determination of annual runoff, **Hydrograph:** Storm hydrograph, Base flow and Separation of base flow, direct runoff hydrograph, Unit hydrograph – theory – assumptions and limitations, Derivation and use of unit hydrograph, S curve.	07
III	**Introduction to Irrigation**: Definition, Advantages and Necessity, Methods of Irrigation, application of water to soil. **Water Requirements of Crops** :Principal crops and crop seasons, cropping pattern and crop rotation, Classes and availability of soil water, Duty, delta, base period and their relationship, factors affecting duty, methods of improving duty	07
IV	**Introduction to dams:** Reservoir planning, Types of dams, selection of site for dams, selection of type of dam, Area elevation curve & Elevation capacity curve, Control levels, silting of reservoirs. **Earthen dam:** Types of earthen dams, Components and their functions, methods of construction of earthen dam, Modes of failure, seepage control measures-Drainage & filters, Swedish slip circle method	07
V	**Gravity Dams:** Forces acting on dam, theoretical and practical profile, high and low dam, Introduction to instrumentation in dams. **Spillway:** Necessity and function components of spillway, different types, types of energy dissipation arrangements, gates for spillway.	07
VI	**Diversion Head Works:** component parts & their functions, difference between weir and barrages, Introduction to Theory of seepage ,Bligh's creep theory, Khosla's theory **Canals:** Types, alignment, typical sections of canals, balancing depth Kennedy's and Lacey's silt theories, concept of canal lining **C.D.Works:** Necessity, Types.	07

Text Book

1 Irrigation Engineering - S. K. Garg, Khanna Publishers

2 Elementary Engineering Hydrology- M.J.Deodhar-Pearson Education

References

1 Irrigation Engineering - S. K. Garg, Khanna Publishers

2 Irrigation, Water Resources and water power engineering- P. N. Modi, Standard Book House.

3 Irrigation and water power Engineering- Dr. Punmia and Dr. Pande, Standard Publisher

4 Elementary Engineering Hydrology- M.J.Deodhar-Pearson Education

5 Engineering hydrology – K. Subramanyam Tata McGraw Hill

6 Hydrology- Principles, Analysis and Desin, Raghunath, New Age International

CET213R1 Highway Engineering

Lecture	Tutorial	Practical	Credits	Evaluation Scheme for (Theory and Practical)			
				Component	Exam	WT	Pass %
3	-	-	3	Theory	FET	20	40
					CAT I	15	
					CAT II	15	
					ESE	50	40

Course Description: Transportation engineering or transport engineering is the application of technology and scientific principles to the planning, design, construction, operation and management of facilities for any mode of transportation to provide for the safe, efficient, rapid, comfortable, convenient, economical, and environmentally compatible movement of people and goods

Course Outcomes: After the end of this course students will able to

CO213.1 Understand[2] highway planning and alignment.

CO213.2 Design[4] of highway crosses sectional elements, Design[4] of Flexible and rigid pavements

CO213.3 Understand[2] the construction of different types of pavements

CO213.4 Understand[2] types of failures and maintenance of pavements, Perform[3] operation and regulation and control of traffic

Course contents

Units	Description	Hours
I	**Highway Planning and Alignment:** Different modes of transportation – historical Development of road construction- Highway Development in India –Classification of roads-Road pattern – Highway planning in India- Highway alignment - Engineering Surveys for alignment	7
II	**Geometric Design of Highways:** The highway crosses sectional elements- Sight Distance - Types of sight distances -Design of horizontal alignments - Super elevation, Widening of Pavements on horizontal curves- transition Curves- Design of Vertical alignments – Gradients- summit and Valley Curves	7
III	**Pavement Design**: Pavement types, components, functions, design factors, Design of flexible pavements, CBR Method, IRC: 37-2001. Design of rigid pavement:	7

	Westergaard's analysis of wheel load stress, temperature stresses. IRC: 58-2002 method of design.	
IV	**Highway Construction**: Highway materials, Construction of WBM roads, bituminous roads-BC, SDBC, DBM; concrete roads- DLC, PQC; Joints in CC pavements; Stabilized roads	7
V	**Highway Maintenance:** Pavement failures: Failures in flexible pavement and rigid pavement; Maintenance of various roads; Importance of highway drainage - Surface Drainage- Subsurface drainage –maintenance of drainage system; Road construction in water logged areas	7
VI	**Traffic Engineering:** Traffic characteristics - Traffic studies-speed, volume, speed and delay, origin-destination, parking and accident studies; capacity of urban roads and highways; traffic operations- regulation and control; design of intersections- at grade and grade separated	7

Text Books

- **Khanna, S.K., Justo, C.E.G.** and **A. Veeraragavan***Highway Materials and Pavement Testing*, 5th Edition, Nem Chand and Bros, Roorkee, India, 2009.

- **Huang, Y.H.** *Pavement Analysis and Design*, Pearson Prentice Hall, New Jersey, USA, 2004.

- Kadiyali L.R. and N.B. Lal (2004): Principles and Practice of Highway Engineering (Including Expressways and AirportEngineering), Khanna Publishers, New Delhi.

- Khanna S.K. and C.E.G. Justo (2000): Highway Engineering, Nem Chand & Bros., Roorkee

- ParthaChakroborty and Animesh Das (2003): Principles of Transportation Engineering, Prentice-Hall India, New Delhi.

References

- Yoder E.J. and Witczak M.W. (1975): Principles of Pavement Design, John Wiley & Sons, Inc., New York.

- Yang, `**Design of Functional Pavements'**, McGraw Hill Book Co.

- Huang, **'Pavement Analysis'**, Elsevier Publications.

- Yang H. Huang (1993): Pavement Analysis and Design, Prentice- Hall.

- IRC: 58-2002 (Second Revision) – Guidelines for the Design of Rigid Pavements for Highways, IRC, New Delhi.

- IRC: 37-2001 – Guidelines for the Design of Flexible Pavements for Highways, IRC, New Delhi.

CET214R1 Building Planning and Drawing

Lecture	Tutorial	Practical	Credits	Evaluation Scheme for (Theory and Practical)			
				Component	Exam	WT	Pass %
2		-	2	Theory (100)	FET	20	40
					CAT I	15	
					CAT II	15	
					ESE	50	40

(Ver 2.0, Program Core, School of Technology)

Course Description: This includes the design of residential planning and Commercial building. This course is divided into six units into two sections. Section – I containsplanning, building bye-laws, section –II includes the architectural design of the building by applying bye-laws and applying principles of planning

Course Outcomes: after the end of this course students will able to

CET214.1   Plan[3] and draw[3] residential building considering the principle of planning and Building By-Laws and regulations.

CET214.2   Develop[3] working plan of plumbing and electrification of building

CET214.3   Illustrate[4] the concept of ventilation, air conditioning, and thermal insulation.

CET214.4   Understand[2] a basic knowledge on Planning of Public Buildings, urbanisation and its trend.

	Course contents	
Units	**Description**	**Hours**
I	Residential Building Drawing: Introduction to planning, elevation, and a section of the building, Development of the detailed plan from the line diagram, standard guidelines for building drawing	05

II	Planning of Residential Buildings: Planning and designing of Residential Buildings by considering Principles of planning- architectural principle, bylaws, and regulations, Aspects of planning within and with respect to surroundings, Modular planning concept	05
III	Plumbing system, Plumbing Materials, Various types of traps, Fittings, Chambers, Need of Septic Tank, Concept of Plumbing and Drainage plan, Introduction to rainwater harvesting. Concept of rain water Gutters. Electrification: - Concealed and Open Wiring, Requirements and Location of various points, Concept of Earthing.	05
IV	Ventilation and Air conditioning: -Necessity of Ventilation, functional requirement, various syste, and section criteria. Introduction to Thermal Insulation and Sound Insulation: Sound Insulation and methods of noise control.Introduction to Acoustics	05
V	Introduction to Planning of Public Buildings: Buildings for different purposes like Education, Health, Recreation, Industry and Transportation, Spatial and land use planning,	05
VI	Town Planning: Introduction, requirements, civil Survey, purpose, type, data required and presentation, Elements of city plan- Zoning, land use zoning and height zoning, growth of towns and Town planning scheme, Control of haphazard development. Industry: Priorities, classification, industrial estates, Redevelopment, Slum Improvement/clearance, Concept of green cities, green building	05

Text Book

1 Civil Engineering Drawing by M. Chakraborti

2 Building Drawing by M.G.Shah,C.M.Kale, S.Y.Patki Tata McGraw Hill Education Pvt.Ltd.,New Delhi

References

1 Building Construction – B.C.Punmia (Laxmi Publications)

2 Basic Civil Engineering – G. K. Hiraskar (DhanpatRai Publications)

3 A Text Book of Building Construction – S.P. Arora, S.P. Bindra (DhanpatRai Publications)

4 Construction Technology (Volume 1 to 4) – R. Chudley (ELBS).

5 A to Z of Practical Building Construction and Its Management- Sandeep Mantri (SatyaPrakashan, New Delhi)

6 SP 7- National Building Code Group 1 to 5- B.I.S. New Delhi

7 I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings

8 Town and country Planning-G.K. Hiraskar& K. G. Hiraskar, By DhanpatRai

   Publication (p) Ltd., 22 Ansari Road, Dariyaganj New Delhi.

9 Town Planning- S.C.Rangwala, Charotar Publications, Pune

CET215R1 Construction Management

(Program Core, School of Technology)							
Lecture	**Tutorial**	**Practical**	**Credits**	**Evaluation Scheme for (Theory and Practical)**			
				Component	Exam	WT	Pass %
3	-	-	3	Theory (100)	FET	20	40
					CAT I	15	
					CAT II	15	
					ESE	50	40

Course Description: This course about importance of various aspects construction management. Also helps in understanding application of engineering economy in construction field

Course Outcomes: after the end of this course students will able to

CET215.1   Explain[2] importance and application of management concept in construction field

CET215.2   Apply[3] knowledge quantitative techniques in construction field

CET215.3   Apply[3] knowledge of project management in construction field

CET215.4   Explain[2] importance and application of Engineering economy in construction field

	Course Content	
Units	**Description**	**Hours**
I	**Introduction To Management** Principles of Management (Henry Fayol) Functions of Management: Planning- Organizing ,StaffingDirecting Supervision, Co-ordination, Communication, Motivation, Leading Controlling –Decision Making: Process, introduction to decision tree	7
II	**Quantitative Techniques** Linear Programming – Simple LP model, Graphical Method, Simplex Method (Concept Only) Transportation Problem, optimality test	7

	Assignment Model. (Balanced and Unbalanced problem) Sensitivity Analysis (Concept Only) Simulation concept	
III	**Material Management and Quality Control** Objectives, Need for Inventory Control, EOQ Analysis, ABC analysis, Safety Stock, Purchase Procedure, Stores Record , site layout Quality Management: Quality Circle, ISO 9000, Sampling and TestingWork Study (Introduction)	7
IV	**Project Management** Introduction, Need for Project Management, , The Project Life Cycle, Phases of Project Management, need of project management , Role of Project Manager (PM), Work Breakdown Structure (WBS)	7
V	**Project Planning and Monitoring** Time Management , Tools for time management Bar Chart/ Gantt Charts-Network analysis- Basic definition application and techniques, PERT and CPM: Introduction, Development of Project Network, Time Estimation, Determination of the Critical Path, Calculations of Floats PERT Model, Time Estimates, Slack, Probability of Project Completion, Network Updating, - introduction ,process, data required for updating, steps in updating application Cost Control- introduction, project cost. Crashing/compression of network. Application Introduction to project management software	7
VI	**Engineering Economics** Importance, Time Value of Money, Equivalence Cash flow diagram, types of interest Economic Comparison Methods: Present Worth Method, EUAC method, Net Present Value, Rate of Return, Benefit- Cost Ratio, Payback Period Method, Capitalized Cost method and Linear Break Even Analysis.	7

Text Book

1 Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, McGraw Hill Publishing Company, New Delhi, 1998.

2 Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM,

Laxmi Publications,2016

References

1. Leland Blnak, Anthony Tarquin, Engineering Economy , Tata McGraw Hill Publishing Company, New Delhi,

2. Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985.

3. Calin M. Popescu, ChotchaiCharoenngam, Project Planning, Scheduling and Control in

4. Construction: An Encyclopedia of terms and Applications, Wiley, New York, 1995.

5. Jha, Kumar Neeraj., Construction Project management, Theory & Practice, PearsonEducation India, 2015

CET216R1 Analysis of Determinate Structures

(Ver 1.0, Program Core, School of Technology)

Lecture	Tutorial	Practical	Credits	Evaluation Scheme for (Theory and Practical)			
				Component	Exam	WT	Pass %
3	-	-	3	Theory	FET	20	40
					CAT I	15	
					CAT II	15	
					ESE	50	40

Course Description:

Different actions of loading on beams and columns are the main focus. Effect of moving loads on internal forces of beams will be taught. Combine action of loading on circular shafts will also be focused.

Course Outcomes: after the end of this course students will able to

CO216.1	Identify the response of elastic body for extern actions, Able to understand the internal forces in the beams.
CO216.2	Distinguish engineering properties of the materials are understood, Compute the design forces in the structures.
CO216.3	Analyze the stress, strain and deformation of elastic bodies under external forces
CO216.4	Able to discuss the internal forces under moving loads

Syllabus (Theory)

Units	Description	Hours
I	Principal stress and strain in two dimensions, Introduction to graphical method. Principal stress in beams and thin cylinders	07
II	Combined direct and bending stresses, eccentric loads, stability analysis of gravity dams, retaining walls and chimneys.	07
III	Influence line diagrams for determinate compound be beams and trusses	07
IV	Slope – deflection of determinate beams - double in integration method, Macaulay's method, moment-area method and conjugate beam method.	07
V	Combined bending, torsion and axial thrust. Theories of failure.	07

VI	Analysis of long columns, Euler's theory and Rankine's theory	07

Text Book

- MTimoshenko and Gere, Mechanics of Materials, CBS Publishers, New Delhi, 1996

References

- "Mechanics of Structure" (Vol. I and II) - Junnarkar S.B. and Advi, CharotarPublication.

- "Mechanics of Materials" - R.C. Hibbler, Pearson Education.

- "Mechanics of Materials" Vol I and II - Punmia, Jain, Laxmi Publications.

- "Strength of Materials" - S Ramamrutham, Dhanapat Rai Publications.

- "Strength of Materials" - Bhavikatti S.S., New Age Publications

CET217R1 Soil Mechanics

(Ver 1.0, Program Core, School of Sciences)

Lecture	Tutorial	Practical	Credits	Evaluation Scheme for (Theory and Practical)			
				Component	Exam	WT	Pass %
3	-	-	3	Theory	FET	20	40
					CAT I	15	
					CAT II	15	
					ESE	50	40

Course Description: The course prepares the student to be able to make effective learning of basic soil mechanics. Basic and Engineering property of soils are explained in detail. It also focuses on Engineering geology. The course should have the pre-requisite of mechanics of solids/strength of materials course.

Course Outcomes: After the end of this course students will able to

CO217.1   Explain[2] index properties of soil

CO217.2   Determine[2] Permeability and Seepage of given soil

CO217.3   Explain[2] compaction and consolidation behaviour of soil, Calculate[3] Stresses and stress distribution in Soil

CO217.4   Calculate[3] shear strength of soil and earth pressure in soils, Identify[1] different types of rocks

Syllabus (Theory)

Units	Description	Hours
I	**Soil, its properties and basic relationships:** soil & soil structure, soil phase system, weight volume relationships, index properties of soil - unit weight, water content, specific gravity, void ratio, porosity, air content, degree of saturation and their relationships and its significance, particle size analysis (introduction to mechanical analysis and wet mechanical analysis), I. S. classification of soil, Cassagrande's Plasticity chart, soil consistency and indices.	7
II	**Permeability and Seepage**: Darcy's law, Factors affecting permeability, introduction to Determination of coefficient of permeability by constant head,	7

	falling head method pumping in test and pumping out test. Permeability of layered soils	
	Seepage forces, Laplace equation, Flow net construction and applications for determination of seepage, Concept of effective neutral & total stress in soil mass., quick sand condition.	
III	**Compaction:** phenomenon. Factors affecting compaction, Dry density and moisture content relationship. Zero air voids line. Effect of compaction on soil structure, Standard Proctor test and Modified Proctor test as per IS – 2720. Field compaction equipment and methods, Field control of compaction

Consolidation: Spring analogy, Terzaghi's theory of one dimensional consolidation, Lab consolidation test; cc, cv, mv and av

Determination of coefficient of consolidation-square root of time fitting method and logarithm of time fitting method. normally consolidated and over consolidated soils, Determination of pre-consolidation pressure | 7 |
| IV | **Stress Distribution in Soil**: Boussinesq theory- point load, strip load, pressure distribution diagram on a horizontal, pressure bulb, introduction to Newmark chart, Westergaard's theory- uniformly loaded rectangular area, contact pressure, approximate stress distribution method- equivalent point load method and 2:1 method. | 7 |
| V | **Shear Strength:** Concept of shear stress and shear strength, Coulomb's theory and failure envelope, Total stress approach and effective stress approach,representation of stresses on Mohr's circle, Mohr-Coulomb's envelope for different types of soilsuch as c soil, phi soil and c-phi soil,

Determination of Shear Strength: type of test - box shear test (UU, CU, CD), triaxial compression test (UU, CU, CD) unconfined compression test, vane shear test.

Earth Pressure: Concept, Area of application, earth pressure at rest, active and passive condition. Rankines theory of earth pressure - dry/moist, submerged (partially and full), horizontal backfill with surcharge, backfill with inclined surcharge and Coulomb's theory of earth pressure | 7 |
| VI | **Introduction to Geology:** Types of rocks, their formation, Structural Geology, Geological Investigations and Geology for Dams, Geology of tunnel | 7 |

Text Book

- K. R. Arora, "Soil Mechanics and Foundation Engineering" Standard Publication.

References

- K. R. Arora, "Soil Mechanics and Foundation Engineering" Standard Publication
- Alam Singh, "Text book of soil mechanics in theory and practice" Asian Publishing House, Bombay.
- N. S. Murthy, "Soil mechanics and Foundation engineering" by V., U. B. S. Publishers and distributors New Delhi.
- B. C. Punmia, "Soil mechanics and Foundation engineering", A Saurabh and Company Pvt. Ltd., Madras.
- P. Purushottam Raj, "Geotechnical Engineering", Tata Mcgraw Hill Company Ltd. New Delhi
- Terzaghi and Peak, "Soil mechanics", John Willey and Sons, New- York.
- T.W. Lambe, "Soil Testing", Willey Eastern Ltd., New Delhi.

CET218R1 Material Testing Lab

(Ver 1.0, Program Core, School of Technology)

Lecture	Tutorial	Practical	Credits	Evaluation Scheme for (Theory and Practical)			
				Component	Exam	WT	Pass %
-	-	2	1	Practical	FET	100	40

Different actions of loading on beams and columns are the main focus. Effect of moving loads on internal forces of beams will be taught. Combine action of loading on circular shafts will also be focused.

Course Outcomes: after the end of this course students will able to

CO218.1 know and differentiate elemental properties of construction materials

CO218.2 Conduct tension test on steel, aluminium, copper and brass

CO218.3 Conduct compression tests on spring, wood and concrete

CO218.4 Conduct flexural and torsion test to determine elastic constants

CO218.5 Determine Modulus of elasticity of beam

CO218.6 Determine hardness of metals

Practical

Two hours per week per batch practical is to be utilized for (A) Term work shall consist of measurement drawing for G+1 building. (B) Term work shall include Auto Cad drawing of residential building /commercial building. (C) Term work shall include field visit and students will have to submit a report on it.

1. To study the stress -strain characteristics of (a) Mild Steel and (b) Tor steel by conducting tension test on U.T.M.
2. To study the stress - strain characteristics of (a) Copper and (b) Aluminium by conducting tension test on Hounsfield Tensometer.
3. To find the Compressive strength of wood and punching shear strength of G.I. sheet by conducting relevent tests on Hounsfield Tensometer.
4. To find the Brinnell's and Vicker's hardness numbers of (a) Steel (b) Brass (c) Aluminium.

5. To determine the Modulus of rigidity by conducting Torsion test on (a) Solid shafts (b) Hollowshaft.

6. To find the energy absorption of (a) Steel (b) Brass (c) Aluminium by IZOD and Charpy impact test.

7. To determine the Young's modulus of the material by conducting deflection test on a simplysupported beam.

8. To determine the Modulus of elasticity of the material by conducting deflection test on aPropped Cantilever beam.

9. To determine the Modulus of elasticity of the material by conducting deflection test on acontinuous beam.

10. Shear test on Mild Steel rods

Text Book

- MTimoshenko and Gere, Mechanics of Materials, CBS Publishers, New Delhi, 1996.

Reference Book

- "Mechanics of Materials" - R.C. Hibbler, Pearson Education.

- "Mechanics of Materials" - Gere and Timoshenko, CBS publishers.

- "Strength of Materials" - S Ramamrutham, Dhanapat Rai Publications.

- "Strength of Materials" - Bhavikatti S.S., New Age Publications

CET219R1 Soil Mechanics Lab

(Ver 1.0, Program Core, School of Technology)

Lecture	Tutorial	Practical	Credits	Evaluation Scheme for (Theory and Practical)			
				Component	Exam	WT	Pass %
-	-	2	1	Practical	FET	50	40
					ESE	50	40

Course Description: The course prepares the student to be able to make effective learning of basic soil mechanics. Basic and Engineering property of soils are explained in detail. It also focuses on Engineering geology. The course should have the pre-requisite of mechanics of solids/strength of materials course.

Course Outcomes: After the end of this course students will able to

CO219.1 Explain^2 index properties of soil

CO219.2 Determine^{2}Permeability and Seepage of given soil

CO219.3 Explain^2 compaction and consolidation behaviour of soil

CO219.4 Calculate^3 shear strength of soil

Syllabus (Practical)

List of Experiments

1. Determination of water content by oven drying.
2. Specific gravity determination by pycnometer / density bottle.
3. Particle size distribution-Dry Mechanical sieve analysis
4. Particle size distribution-hydrometer analysis
5. Determination of consistency limits (minimum 2- LL, PL, SL) and its use in soil classification.
6. Field density test by core cutter
7. Field density test by sand replacement method
8. Determination of co-efficient of permeability by variable head method.
9. Standard proctor test/ Modified proctor test.
10. Direct shear test – CD
11. Unconfined Compression Test

12. Triaxial shear test

CET220R1 Building Planning Lab

(Program Core, School of Technology)							
Lecture	**Tutorial**	**Practical**	**Credits**	**Evaluation Scheme for (Theory and Practical)**			
				Component	**Exam**	**WT**	**Pass %**
-	-	2	1	Practical	ISE	50	40
					EOE	25	

Course Outcomes: After the end of this course students will able to pan and draw a building drawing. This course requiresoperational skill and knowledge of AutoCAD.

CET220.1 Illustrate[4] the concept of building Planning

CET220.2 Plan[3] and draw[3] residential building considering the principle of planning and Building Bye-Laws and regulations.

CET220.3 Draw[3] the working drawing of foundation detail, plumbing and electrification of building.

CET220.4 Understand[2] the public building in various aspects.

Laboratory Work

The students are expected to draw the followingdrawing sheets:

1 **Measurement drawing**

    a) Imperial size sheet based on actual measurement of an existing residential building consisting of the plan, elevation, section passing through the staircase. Site plan. Area statement and brief specifications (G+1 building and a minimum of 5 rooms, Measurement drawing should be done in**a** group of a maximum of 5 students).

    b) Site visit along with the report.

2 **Planning and design of the residential building (G+1).**

    a) Municipal Submission drawing.

b) Working Drawings- Foundation / Center Line Drawing., Furniture layout plan, Electrificationplan, Water supply, and drainage plan.

(Using Auto Cad)

3   **Planning and design of the public building**

     a)   Prepare a detailed report by understanding the design and planning of any public building

     b)   Site visit along with the report.

Text Book

1   M. G. Shah, C. M. Kale, and S. Y. Patki, Building Drawing with an integrated approach to Build Environment, Tata McGraw-Hill

2   S. Kaleem A. Zaidi and Suhail Siddiqui, Drawing and Design of Residential and Commercial Buildings, Standard Publishers.

References

1   Y. N. Raja Rao, Planning and Designing of a residential building, Standard Publishers.

2   National building code of India.

CET221R1 Professional Development – II

(Ver 1.0, Program Core, School of Technology)

For Sem-IV of B. Tech (Common for All Branches)

Lect.	Tut.	Practical	Credits	Evaluation Scheme for (Th and Pr)			
				Component	Exam	WT	Pass
-	-	2	1		CAT I	-	
					CAT II	-	
					ESE	-	
				Pr (100)	TW	50	Min 50
					POE	50	

Course Description: This course is the extension of the Professional Development – I course of third semester. The course aims to develop leadership skills and sharpen their decision making skills. The major focus of the course is to prepare students for job.

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

CO221.1 : demonstrate[3] leadership skills

CO221.2 : evaluate[6] process and practical ways of decision making

CO221.3 : judge[6] causes of stress and find remedies to reduce stress

CO221.4 : apply[3] business etiquettes and ethics

CO221.5 : exhibit[3] group discussion and Interview skills

Syllabus

Units	Description	Hrs.
I	**Leadership:** Skills for a good Leader, Assessment of Leadership Skills **Creativity:** Lateral thinking, vertical thinking,Out of box thinking	4
II	**Decision Making:** Importance and necessity of Decision Making, Process and practical way of Decision Making, Weighing Positives & Negatives.	4
III	**Stress Management**: Causes of Stress and its impact, how to manage & distress, Circle of control, Stress Busters. **Emotional Intelligence**: What is Emotional Intelligence, dealing with feelings,	4

	emotional quotient, why Emotional Intelligence matters, Emotion Scales. Managing Emotions.	
IV	**Adapting to corporate life**: Corporate Grooming and dressing, Business Etiquette Business Ethics, Dinning Etiquette, Ethics policy	4
V	**Group Discussion:** Group discussions as part of selection process. Structure of a group discussion, Dynamics of group behavior, techniques for effective participation, Team work and use of body language. **Interview:** Process, techniques, Pre-In-After the interview preparation.	4

References:

1. Wallace & Masters, Personal development for Life & work, Thomson Learning.

2. Barun K. Mitra ,Personality Development and Soft- Skills , Oxford University Press.

 3. Fred Luthans, Organizational behavior, McGraw Hill.

4. Asa Don Brown, Interpersonal skills in the Workplace, Tate publishing and Enterprises.

Web links

https://www.monster.com/career-advice/article/soft-skills-you-need
www.saddleback.edu/book/export/html/4405
https://www.wikijob.co.uk/content/interview-advice/competencies/soft-skills
http://www.indiabix.com/
https://www.edx.org/professional-certificate/ritx-soft-skills
https://www.bookmytrainings.com/soft-skills-trainings
www.softskilltraininggroup.com/
www.softskillsindia.com
www.niit.com/solution/soft-skill-training
https://www.skillsyouneed.com/interpersonal-skills.html

CET222R1 Environmental Science

Lect.	Tut.	Pract.	Credits	Evaluation Scheme			
				Component	Exam	WT	Pass
1	-	-	--	--	--	--	--

Course Description: The course, Environmental Studies discuss basic concepts of ecology, pollution and biodiversity. It covers the fundamental knowledge of nature around us with special focus on natural resource management. The course also introduces environmental legislation to students along with different national and international environmental issues. The prime objective of this course is to make students aware and responsible in protection of environment at local to international level.

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

CO1:   Describe[1] multidisciplinary nature and importance of Environmental Studies

CO2:   Explain[2] concept of ecosystem and natural recourses

CO3:   Recognize[1] importance of biodiversity, threats and conservation practices

CO4:   Explain[2] concept of environmental pollution, causes, effects and control measures

CO5:   Describe[1] global environmental issues and lows.

CO6:   Associate[2] relationship between human community and environment

Syllabus (Theory)

Units	Description	Hours
I	**a) Introduction to environmental studies:** Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development. Renewable and non-renewable resources: **b) Natural resources and associated problems** Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and	3

	problems. Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Energy Resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources, case studies **c)** Role of individual in conservation of natural resources. **d)** Equitable use of resources for sustainable life styles.	
II	**Concept of an eco-system** Structure and function of an eco-system. Producers, consumers, decomposers. Energy flow in the eco systems. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following eco systems: Forest ecosystem Grass land ecosystem Desert ecosystem. Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries)	3
III	**Biodiversity and Conservation** Introduction-Definition: genetics, species and ecosystem diversity. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values Biodiversity at global, national and local level. India as a mega diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitats loss, poaching of wild life, man wildlife conflicts. Endangered and endemic spaces of India. Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity	3
IV	**Environmental Pollution** Definition Causes, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards Solid waste Management: Causes, effects and control measures of urban and industrial wastes and study of E-waste Role of an individual in prevention of pollution Pollution case studies	3

	Disaster management: Floods, earth quake, cyclone and landslides.		
V	**Social Issues and environment** Form unsustainable to sustainable development Urban problems related to energy Water conservation, rain water harvesting, water shed management Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. Environment protection Act Air (prevention and control of pollution) Act Water (prevention and control of pollution) Act Wildlife protection act Forest conservation act Issues involved in enforcement of environmental legislations Public awareness	8
VI	**Human Population and the environment** Growth and variation among nations Population explosion- family welfare program Environment and human health Human rights Value education HIV / AIDS Women and child welfare Role of information technology in environment and human health Case studies	2

Environmental Studies Project (Field Work)
(Ver 1.0, University Core, School of Science)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme			
				Component	**Exam**	**WT**	**Pass**
-	-	2	--	Practical (100)	FEP	100	Min 40

Course Description: This course expose students to local environmental issues. It covers scientific interpretation of environmental issues and construct possible systematic solution for problem. It includes exposure to local ecosystems, biodiversity and discuss about the fate of natural resources.

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

CO1   Classify^2 natural recourses and their conditions in local area

CO2   Interpret^2 local environmental issues

CO3   Describe^1 local common biodiversity

CO4   Analyze^4 and modify^3 solution on local environmental issues

Field Work

Description
- Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.   - Visit to a local polluted Site-Urban/Rural/Industrial/Agricultural.   - Study of common plants, insects, birds and basic principles of identification.   - Study of simple ecosystems-pond, river, etc.