CHOICE BASED CREDIT SYSTEM (CBCS)
SCHEME OF TEACHING AND EXAMINATION 2017-2018
B.E. CONSTRUCTION TECHNOLOGY & MANAGEMENT

III SEMESTER

Sl. No	Subject Code	Subject	Teaching Department	Teaching Hours/Week		Examination			Total	Credits
				Theory	Practical/ Drawing	Duration	SEE Marks	CIE Marks	Total Marks	
1	17MAT31	Engineering Mathematics – III*	Maths	04		03	60	40	100	4
2	**17CT/CV32**	**Strength of Materials**	CTM/CIVIL	04		03	60	40	100	4
3	17CT33	Materials of Construction	CTM/CIVIL	04		03	60	40	100	4
4	17CT34	Surveying – I	CTM/CIVIL	04		03	60	40	100	4
5	**17CT/CV35**	**Engineering Geology**	CTM/CIVIL	04		03	60	40	100	3
6	17CT36	Management Theory – Principles & Practices	CTM/CIVIL	03		03	60	40	100	4
7	17CTL37	Surveying Practice – I	CTM/CIVIL		1I+2P	03	60	40	100	2
8	17CTL38	Construction Materials Testing Lab – I	CTM/CIVIL		1I+2P	03	60	40	100	2
9	17KL/CPH39/49	Kannada/Constitution of India, Professional Ethics and Human Rights	Humanities	01		01	30	20	50	1
Total				**Theory: 24hours Practical: 06 hours**		**24**	**510**	**340**	**850**	**28**

1. **Kannada/Constitution of India, Professional Ethics and Human Rights:** 50 % of the programs of the Institution have to teach Kannada/Constitution of India, Professional Ethics and Human Rights in cycle based concept during III and IV semesters.

2. **Audit Course:**

i. *All lateral entry students (except B.Sc candidates) have to register for Additional Mathematics – I, which is 03 contact hours per week.

1	17MATDIP31	Additional Mathematics –I	Maths	03		03	60	-	60	-

ii. Language English (Audit Course) be compulsorily studied by all lateral entry students (except B.Sc candidates)

CHOICE BASED CREDIT SYSTEM (CBCS)
SCHEME OF TEACHING AND EXAMINATION 2017-2018
B.E. CONSTRUCTION TECHNOLOGY & MANAGEMENT

IVSEMESTER

Sl. No	Subject Code	Subject	Teaching Department	Teaching Hours/Week		Examination			Total	Credits
				Theory	Practical/ Drawing	Duration	SEE Marks	CIE Marks	Total Marks	
1	17MAT41	Engineering Mathematics – IV	Maths	04		03	60	40	100	4
2	17CT42	Structural Analysis	CTM/CIVIL	04		03	60	40	100	4
3	17CT43	Surveying – II	CTM/CIVIL	04		03	60	40	100	4
4	**17CV/CT 44**	**Concrete Technology**	CTM/CIVIL	04		03	60	40	100	4
5	17CT45	Building Construction	CTM/CIVIL	04		03	60	40	100	4
6	17CT46	Financial and Cost Accounting	MBA	03		03	60	40	100	3
7	17CTL47	Surveying Practice – II	CTM/CIVIL		1I+2P	03	60	40	100	2
8	17CTL48	Construction Materials Testing Lab – II	CTM/CIVIL		1I+2P	03	60	40	100	2
9	17KL/CPH39/49	Kannada/Constitution of India, Professional Ethics and Human Rights	Humanities	01		01	30	20	50	1
Total				**Theory: 24hours Practical: 06 hours**		**25**	**510**	**340**	**850**	**28**

1. **Kannada/Constitution of India, Professional Ethics and Human Rights:** 50 % of the programs of the Institution have to teach Kannada/Constitution of India, Professional Ethics and Human Rights in cycle based concept during III and IV semesters.

2. Audit Course:

i. *All lateral entry students (except B.Sc candidates) have to register for Additional Mathematics – II, which is 03 contact hours per week.

1	17MATDIP41	Additional Mathematics –II	Maths	03		03	60	-	60	-

ii. Language English (Audit Course) be compulsorily studied by all lateral entry students (except B.Sc candidates)

CHOICE BASED CREDIT SYSTEM (CBCS)
SCHEME OF TEACHING AND EXAMINATION 2017-2018
B.E. CONSTRUCTION TECHNOLOGY & MANAGEMENT

V SEMESTER

Sl. No	Subject Code	Subject	Teaching Department	Teaching Hours/Week		Examination			Total	Credits
				Theory	Practical/ Drawing	Duration	SEE Marks	CIE Marks	Total Marks	
1	17CT/CV 51	Design of RCC Structural Elements	CTM/CIVIL	04		03	60	40	100	4
2	17CT52	Construction Economics and Finance	MBA	04		03	60	40	100	4
3	17CT53	Geotechnical Engineering	CTM/CIVIL	04		03	60	40	100	4
4	17CT54	Transportation Engineering	CTM/CIVIL	04		03	60	40	100	4
5	17CT55X	Professional Elective-1	CTM/CIVIL	03		03	60	40	100	3
6	17CT56X	Open Elective-1	CTM/CIVIL	03		03	60	40	100	3
7	17CTL57	Computer Aided Building Drawing	CTM/CIVIL		1I+2P	03	60	40	100	2
8	17CTL58	Geotechnical Engineering Laboratory	CTM/CIVIL		1I+2P	03	60	40	100	2
Total				**Theory: 22hours Practical: 06 hours**		**24**	**480**	**320**	**800**	**26**

Professional Elective 1		**Open Elective 1*** **	
17CV/CT551	Air Pollution	17CT561	Engineering Ethics
17CT552	Advance Surveying	17CT562	Special Concrete
17CT553	Building Standards and Planning	17CV/CT563	Remote Sensing and GIS
17CT554	Fundamentals of Architecture	17CT564	Climate change and Sustainable Development

***Students can select any one of the open electives offered by any Department (Please refer to consolidated list of VTU for open electives).
Selection of an open elective is not allowed, if:

· The candidate has no pre – requisite knowledge.

· The candidate has studied similar content course during previous semesters.

· The syllabus content of the selected open elective is similar to that of Departmental core course(s) or to be studied Professional elective(s).

Registration to open electives shall be documented under the guidance of Programme Coordinator and Adviser.

CHOICE BASED CREDIT SYSTEM (CBCS)
SCHEME OF TEACHING AND EXAMINATION 2017-2018
B.E. CONSTRUCTION TECHNOLOGY & MANAGEMENT

VI SEMESTER

Sl. No	Subject Code	Subject	Teaching Department	Teaching Hours/Week		Examination			Total	Credits
				Theory	Practical/ Drawing	Duration	SEE Marks	CIE Marks	Total Marks	
1	17CT61	Construction Quality Management	CTM/CIVIL	04		03	60	40	100	4
2	17CT62	Building Services-I	CTM/CIVIL	04		03	60	40	100	4
3	17CT63	Fluid Mechanics And Hydraulic Machines	CTM/CIVIL	04		03	60	40	100	4
4	17CT64	Construction Planning And Control	CTM/CIVIL	04		03	60	40	100	4
5	17CT65X	Professional Elective-2	CTM/CIVIL	03		03	60	40	100	3
6	17CT66X	Open Elective-2	CTM/CIVIL	03		03	60	40	100	3
7	17CTL67	Construction Technology Lab	CTM/CIVIL		1I+2P	03	60	40	100	2
8	17CTL68	Computer Application Lab	CTM/CIVIL		1I+2P	03	60	40	100	2
Total				**Theory: 22hours Practical: 06 hours**		**24**	**480**	**320**	**800**	**26**

Professional Elective 2		Open Elective 2***	
17CT651	INFRASTRUCTURE VALUATION	17CT661	OPERATIONAL RESEARCH
17CT652	GROUND IMPROVEMENT TECHNIQUES	17CT662	ENVIRONMENTAL IMPACT ASSESMENT
17CT653	WATER SUPPLY AND SANITATION	17CT663	HUMAN RESOURCE MANAGEMENT
17CT654	LANDSCAPE DESIGNING AND PLANNING		

***Students can select any one of the open electives offered by any Department (Please refer to consolidated list of VTU for open electives).
Selection of an open elective is not allowed, if:

· The candidate has no pre – requisite knowledge.
· The candidate has studied similar content course during previous semesters.
· The syllabus content of the selected open elective is similar to that of Departmental core course(s) or to be studied Professional elective(s).

Registration to open electives shall be documented under the guidance of Programme Coordinator and Adviser.

CHOICE BASED CREDIT SYSTEM (CBCS)
SCHEME OF TEACHING AND EXAMINATION 2017-2018
B.E. CONSTRUCTION TECHNOLOGY & MANAGEMENT

VII SEMESTER

Sl. No	Subject Code	Subject	Teaching Department	Teaching Hours/Week		Examination			Total	Credits
				Theory	Practical/ Drawing	Duration	SEE Marks	CIE Marks	Total Marks	
1	17CT71	Building Services-II	CTM/CIVIL	04		03	60	40	100	3
2	17CT72	Design of Steel Structures	CTM/CIVIL	04		03	60	40	100	4
3	17CT73	Estimation & Costing	CTM/CIVIL	04		03	60	40	100	4
4	17CT74	Construction Method & Equipments	CTM/CIVIL	04		03	60	40	100	3
5	17CT75X	Professional Elective- 3	CTM/CIVIL	03		03	60	40	100	3
6	17CT76X	Professional Elective- 4	CTM/CIVIL	03		03	60	40	100	3
7	17CTL77	Building Services Lab	CTM/CIVIL		1I+2P	03	60	40	100	2
8	17CTL78	Project Work Phase I + Seminar	CTM/CIVIL			-	-	100	100	2
Total				**Theory: 18hours Practical and Project: 09 hours**		**21**	**420**	**380**	**800**	**24**

Professional Elective- 3		**Professional Elective- 4**	
17CT751	Design of Pre stressed Concrete Structures	17CT761	Solid Waste Management
17CT752	Bridge Engineering	17CT762	Pavement Materials & Construction
17CT753	Alternate Building Materials And Technologies	17CT763	Urban Planning And Modern Architecture
17CT754	Pre-Fabrication Construction Techniques	17CT764	Computer Applications In Construction Engineering and Planning

Project Phase-I + Seminar: Literature Survey, Problem Identification, objectives and Methodology, Submission of synopsis and seminar. **CIE marks shall be based on the report covering Literature Survey, Problem identification, Objectives and Methodology and Seminar presentation skill.**

CHOICE BASED CREDIT SYSTEM (CBCS)
SCHEME OF TEACHING AND EXAMINATION 2017-2018
B.E. CONSTRUCTION TECHNOLOGY & MANAGEMENT

VII SEMESTER

Sl. No	Subject Code	Subject	Teaching Department	Teaching Hours/Week		Examination			Total	Credits
				Theory	Practical/ Drawing	Duration	SEE Marks	CIE Marks	Total Marks	
1	17CT81	Contracts Management	CTM/CIVIL	04		03	60	40	100	4
2	17CT82	Construction Safety Management	CTM/CIVIL	04		03	60	40	100	4
3	17CT83X	Professional Elective- 5	CTM/CIVIL	03		03	60	40	100	3
4	17CT84	CONSTRUCTION STUDY PROJECT(Internship)	CTM/CIVIL	Industry Oriented		03	50	50	100	2
5	17CTP85	Project Work-II	CTM/CIVIL	-	06	03	100	100	200	6
6	17CTS86	Seminar on current trends in Engineering and Technology	CTM/CIVIL	-	04	-	-	100	100	1
Total				**Theory: 11hours Project and Seminar: 10 hours**		**15**	**330**	**370**	**700**	**20**

Professional Elective- 5	
17CT831	Repair & Rehabilitation of Structures
17CT832	Urban Transportation & Planning
17CT833	Advanced Foundation Engineering
17CT834	Structural Masonry

Internship/ Professional Practice: 4 Weeks internship to be completed between the (VI and VII semester vacation) and/or (VII and VIII semester vacation) period

Course Title: STRENGTH OF MATERIALS

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – III

Subject Code	17CV32	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03

CREDITS – 04

Course objectives: This course will enable students;

1. To understand the basic concepts of the stresses and strains for different materials and strength of structural elements.
2. To know the development of internal forces and resistance mechanism for one dimensional and two dimensional structural elements.
3. To analyse and understand different internal forces and stresses induced due to representative loads on structural elements.
4. To analyse and understand principal stresses due to the combination of two dimensional stresses on an element and failure mechanisms in materials.
5. To evaluate the behavior of torsional members, columns and struts.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Simple Stresses and Strain: Introduction, Definition and concept and of stress and strain. Hooke's law, Stress-Strain diagrams for ferrous and non-ferrous materials, factor of safety, Elongation of tapering bars of circular and rectangular cross sections, Elongation due to self-weight. Saint Venant's principle, Compound bars, Temperature stresses, Compound section subjected to temperature stresses, state of simple shear, Elastic constants and their relationship.	**10 Hours**	**L2,L3**
Module -2:		
Compound Stresses: Introduction, state of stress at a point, General two dimensional stress system, Principal stresses and principal planes. Mohr's circle of stresses	**5 Hours**	**L2,L4**
Thin and Thick Cylinders: Introduction, Thin cylinders subjected to internal pressure; Hoop stresses, Longitudinal stress and change in volume. Thick cylinders subjected to both internal and external pressure; Lame's equation, radial and hoop stress distribution.	**5 Hours**	**L2,L4**

Module-3:		
Shear Force and Bending Moment in Beams: Introduction to types of beams, supports and loadings. Definition of bending moment and shear force, Sign conventions, relationship between load intensity, bending moment and shear force. Shear force and bending moment diagrams for statically determinate beams subjected to points load, uniformly distributed loads, uniformly varying loads, couple and their combinations.	**10 Hours**	**L2,L4**
Module -4:		
Bending and Shear Stresses in Beams: Introduction, pure bending theory, Assumptions, derivation of bending equation, modulus of rupture, section modulus, flexural rigidity. Expression for transverse shear stress in beams, Bending and shear stress distribution diagrams for circular, rectangular, 'I', and 'T' sections. Shear centre(only concept)	**6 Hours**	**L2.L4**
Columns and Struts: Introduction, short and long columns. Euler's theory; Assumptions, Derivation for Euler's Buckling load for different end conditions, Limitations of Euler's theory. Rankine-Gordon's formula for columns.	**4 Hours**	**L2,L4**
Module -5:		
Torsion in Circular Shaft: Introduction, pure torsion, Assumptions, derivation of torsion equation for circular shafts, torsional rigidity and polar modulus Power transmitted by a shaft, combined bending and torsion.	**7 Hours**	**L2,L4**
Theories of Failure: Introduction, maximum principal stress theory (Rankine's theory), Maximum shearing stress theory (Tresca's theory), Strain energy theory (Beltrami and Haigh), and maximum strain theory (St. Venant's theory).	**3 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able;

1. To evaluate the strength of various structural elements internal forces such as compression, tension, shear, bending and torsion.
2. To suggest suitable material from among the available in the field of construction and manufacturing.
3. To evaluate the behavior and strength of structural elements under the action of compound stresses and thus understand failure concepts.
4. To understand the basic concept of analysis and design of members subjected to torsion.
5. To understand the basic concept of analysis and design of structural elements such as columns and struts.

Program Objectives (as per NBA)

1. *Engineering Knowledge.*
2. *Problem Analysis.*
3. *Interpretation of data.*

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- ***The students shall answer Five full questions selecting one full question from each module.***
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. B.S. Basavarajaiah, P.Mahadevappa "Strength of Materials" in SI Units, University Press (India) Pvt. Ltd., 3rd Edition, 2010
2. Ferdinand P. Beer, E. Russell Johnston and Jr.John T. DeWolf "Mechanics of Materials", Tata McGraw-Hill, Third Edition, SI Units

Reference Books:

1. D.H. Young, S.P. Timoshenko " Elements of Strength of Materials" East West Press Pvt. Ltd., 5th Edition (Reprint 2014)
2. R K Bansal, "A Textbook of Strength of Materials", 4th Edition, Laxmi Publications, 2010
3. S.S. Rattan " Strength of Materials" McGraw Hill Education (India) Pvt. Ltd., 2nd Edition (Sixth reprint 2013)
4. Vazirani, V N, Ratwani M M. and S K Duggal "Analysis of Structures Vol. I", 17th Edition, Khanna Publishers, New Delhi.

Course Title: MATERIALS OF CONSTRUCTION

[As per Choice Based Credit System (CBCS) scheme]
SEMESTER – III

Subject Code	17CT33	IA Marks	40
Number of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS – 04

Course objectives:

The objectives of this course is to make students to learn:

1. In recognizing the quality of materials required for construction works
2. In recognizing the good binding materials used in construction
3. In selection of quality building service and maintenance materials.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1		
Basic Engineering Materials: Varieties of building stones quarrying, different varieties of bricks, tiles and their manufacture, quality, suitability and choice of stones, bricks, tiles – their engineering uses. Improved brick from inferior soils, Hand moulding brick, table semi mechanized brick making plant, High draught Kiln. Woodwool/coir-cement corrugated sheets. Asphaltic corrugated sheets, clay flooring and terracing tiles. **Timber:** Varieties and uses – defects in timber and causes of decay, Test for good timber, seasoning, preservation & fire proofing, plywood & its uses.	**10 Hours**	**L1,L2**

Module -2		
Lime and Lime Mortar: Hydraulic and fat limes and their manufacture. Improved design of kilns for the burning of lime. Activated lime-Pozzolana mixture. **Cements, Cement mortar and cement concrete:** Portland cement, Non-Portland cements, GYPSUM, Magnesium oxychloride - Manufacture of cement, classification, properties and uses-proportioning of ingredients and strength of concrete, light weight concrete.	**10 Hours**	**L1,L2**
Module -3		
Properties and application of metals and alloys: Cast Iron, Wrought Iron, Plain carbon steel, Tool steel, Stainless steel, Elementary ideas of hardening, tempering and annealing, copper, aluminum, lead bronze solders, white metals and zinc. **Glass:** Types and uses of glass as an engineering material. a) Rubber: Types, Vulcanization and compounding of rubber, synthetic rubber. b) Bitumen and Asphalt: General properties and uses, Plaster of Paris, surki-mortar-General properties and uses.	**10 Hours**	**L1,L2**
Module -4		
Electrical, Thermal and sound insulations: A brief account of their physical properties and uses. **Surface preservatives:** Metallic coating by hot dipping Electro plating, spraying and cementation, specific examples of inorganic chemical coating, organic chemical coatings with paints, pigments, varnish and enamels.	**10 Hours**	**L1,L2**

Module -5		
Plastics: Composition - classification of plastic – Resins – properties, Moulding and plastics, uses of plastics in building industry. **Refractors Materials:** Classification of refractories, properties and uses-Proportioning of the silicon, Magnesite, Chromite, Carbon bricks and insulating, wool wood board foarmed concrete, plastic composite panels, solar timber seasoning kiln.	**10 Hours**	**L1,L2**
Course outcomes: After successful completion of the course, the student will be able to: **1.** Select suitable materials for building construction works **2.** Adopt suitable repair and maintenance work to enhance durability of buildings		
Program Objectives (as per NBA) *4. Engineering Knowledge.* ***5.*** *Problem Analysis.* ***6.*** *Interpretation of data.*		
Question paper pattern: • The question paper will have Ten questions, each full question carrying 16 marks. • There will be two full questions (with a maximum Three sub divisions, if necessary) from each module. • Each full question shall cover the topics under a module. • The students shall answer Five full questions selecting one full question from each module. • If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.		
Text Books: 1. A Text book of Engineering Materials, by G.J. Kulkarni		
Reference Books: 1. Engineering materials by Rangawala 2. Engineering Materials by Sunil Kumar 3. Engineering Materials by Vernon B. John. 4. Engineering Materials by Roy Choudhary. 5. Materials and Processes by Young. 6. Advances in Building Materials and Construction by Mohan Rai and M.P. Jain Singh – publication by CBRI, Roorkee		

Course Title: SURVEYING-I

[As per Choice Based Credit System (CBCS) scheme]
SEMESTER – III

Subject Code	17CT34	IA Marks	40
Number of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS – 04

Course objectives:
This course will enable students to;
1. Understand the classifications and its basic principles of surveying.
2. Learn the measurement of horizontal distances by chaining/taping and concepts of chain surveying.
3. Employ conventional surveying data capturing techniques and process the data for computations.
4. Analyze the obtained spatial data for draw contours and preparation of maps.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1		
Introduction: Definition of Surveying, Classification of Surveys, Uses of Surveying Units of Measurements, Map & Classification, Survey of India topographical Maps and their numbering, Basic principles of surveying, Errors, Classification, Precision and accuracy.	**6 Hours**	**L1, L2**
Measurement of horizontal distances: Chain and types, Tape and types, EDM devices, Ranging of lines, Direct and Indirect measurement of distances over sloping grounds, Chain and Tape corrections - Numerical problems.	**4 Hours**	**L1, L2**

Module -2		
Chain Surveying: Accessories required, Selection of stations and lines, Offsets and types, Setting out of right angles, Working principle and use of optical square, prism square, cross staff, Linear methods of setting out right angles, Booking of chain survey work, Field book, entries, conventional symbols, Obstacles in chain survey, Numerical problems, Errors in chain survey and precautions to be taken.	**5 Hours**	**L1,L2,L3**
Introduction to Compass Surveying: Meridians and bearings, Principle, working and use of - Prismatic compass, Surveyor's compass, Magnetic bearing, true bearings, WCB and Reduced bearing. Dip and Declination, Accessories required for compass surveying	**5 Hours**	**L1,L2,L3**
Module -3		
Compass Surveying continued...: Traverse - closed and open traverse, Computation of bearings of legs of closed traverse given the bearing of one of the legs, Computation of included angles given the bearings of legs of a closed traverse.	**4 Hours**	**L2, L3**
Compass Traversing Local attraction, determination and corrections, Dependent and independent co-ordinates, Checks for closed traverse and determination of closing error and its direction, Bowditch's graphical method of adjustment of closed traverse, Bowditch's rule and transit rule, Omitted measurements (Only Length and corresponding bearing of one line).	**6 Hours**	**L2, L3**
Module -4		
Levelling: Principles and basic definitions, Fundamental axes and part of a dumpy level, Types of adjustments and objectives, Temporary adjustments of a dumpy level, Sensitiveness of bubble tube, Curvature and refraction correction, Type of leveling, Simple	**10Hours**	**L3,L4**

leveling, Reciprocal leveling, Profile leveling, Cross sectioning, Fly leveling, Booking of levels, Rise and fall method and Height of instrument method, comparison Arithmetic checks, Fly back leveling, Errors and precautions.		
Module -5:		
Contouring: Contours and their characteristics, Methods of contouring, direct and indirect methods, Interpolation techniques, Uses of contours, Numerical problems on determining inter-visibility, Grade contours and uses. **Plane Table Surveying:** Plane table and accessories, Advantages and limitations of plane table survey, Orientation and methods of orientation, Methods of plotting – Radiation, Intersection, Traversing, Resection method, Two point and three point problems, Solution to two point problem by graphical method, Solution to three point problem Bessel's graphical method, Errors in plane table survey.	**10Hours**	**L1,L2,L3** **L1,L2,L3**

Course outcomes:

After a successful completion of the course, the student will be able to:

1. Posses a sound ***knowledge*** of fundamental principles of surveying.
2. Measurement of vertical and horizontal distances to arrive at solutions to basic surveying problems.
3. Understand the computations of linear and angular dimensions to arrive at basic surveying problems
4. Analyze the obtained spatial data to draw contours and preparation of maps by plane table surveying.

Program Objectives (as per NBA)

7. *Engineering Knowledge.*
8. *Problem Analysis.*
9. *Interpretation of data.*

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum Three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- The students shall answer Five full questions selecting one full question from each module.
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. B.C. Punmia, "Surveying Vol.1", Laxmi Publications pvt. Ltd., New Delhi – 2009.
2. Kanetkar T P and S V Kulkarni , Surveying and Leveling Part I, Pune Vidyarthi Griha Prakashan, 1988

Reference Books:

1. S.K. Duggal, "Surveying Vol.1", Tata McGraw Hill Publishing Co. Ltd. New Delhi. – 2009.
2. K.R. Arora, "Surveying Vol. 1" Standard Book House, New Delhi. – 2010
3. R Subramanian, Surveying and Leveling, Second edition, Oxford University Press, New Delhi
4. A. Bannister, S. Raymond , R. Baker, "Surveying", Pearson, 7th ed., New Delhi

Course Title: ENGINEERING GEOLOGY

[As per Choice Based Credit System (CBCS) scheme]
SEMESTER – III

Subject Code	17CT/CV35	IA Marks	40
Number of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS – 04

Course objectives:
This course will enable students;
1. To understand the internal structure and composition of the earth.
2. To comprehend the properties, occurrence and uses of minerals in various industries.
3. To learn about geo-morphological agents such as river, wind, sea waves, and their implications in implementing civil engineering projects.
4. To gain knowledge about the structures of the rocks and their considerations in the selection of site for dams, tunnels, bridges and highways.
5. To learn the application of Topographic maps, remote sensing and GIS in Civil engineering practices and natural resource management.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1		
Introduction: Application of Earth Science in Civil Engineering Practices, Understanding the earth, internal structure and composition. **Mineralogy:** Mineral properties, composition and their use in the manufacture of construction materials - Quartz Group (Glass); Feldspar Group (Ceramic wares and Flooring tiles); Kaolin (Paper, paint and textile); Asbestos (AC sheets); Carbonate Group (Cement) ; Gypsum (POP, gypsum sheets, cement); Mica Group (Electrical industries); Ore minerals - Iron ores (Steel); Chromite (Alloy); Bauxite (aluminum); Chalcopyrite (copper)	**10 Hours**	**L1,L2**

Module -2		
Petrology: Formation, Classification and Engineering Properties. Rock as construction material, concrete aggregate, railway ballast, roofing, flooring, cladding and foundation. Deformation of rocks, Development of Joints, Folds, Faults and Unconformities. Their impact in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges, Rock Quality Determination (RQD), Rock Structure Rating (RSR),: Igneous Rocks - Granite, Gabbro, Dolerite, Basalt; Sedimentary rocks - Sandstone, Shale, Limestone, Laterite; Metamorphic rocks - Gneiss, Quartzite, Slate, Charnockite: Decorative stones - Porphyries, Marble and Quartzite.	**10 Hours**	**L2,L3**
Module -3		
Geomorphology and Seismology: Landforms – Classification, Rock weathering, types and its effects on Civil Engineering Projects. Study of Geo-morphological aspects in the selection of sites for Dams, Reservoirs, Tunnels, Highways and Bridges. Watershed management, Floods and their control, River valley, Drainage pattern – parameters and development; Coastlines and their engineering considerations. Earthquake - Causes and Effects,, Seismic waves, Engineering problems related to Earthquakes, Earthquake intensity, Richter Scale, Seismograph, Seismic zones- World and India, Tsunami – causes and effects. Early warning system. Reservoir Induced Seismicity; Landslides – causes and their control.	**12 Hours**	**L2, L3, L5**
Module -4		
Hydrogeology: Hydrological cycle, Occurrence of Groundwater in different terrains -Weathered, Hard and Stratified rocks; Determination of Quality aspects - SAR, RSC and TH of Groundwater. Groundwater Pollution, Groundwater Exploration- Electrical Resistivity and Seismic methods, Resistivity curves, Water Bearing Formations, Aquifer types and parameters - Porosity, Specific yield and retention, Permeability, Transmissibility and Storage Coefficient. Springs and Artesian Wells, Artificial Recharging of Groundwater, Sea water intrusion and remedies.	**8 Hours**	**L4,L5**

Module -5:		
Geodesy: Study of Topographic maps and Contour maps; Remote Sensing – Concept, Application and its Limitations; Geographic Information System (GIS) and Global Positioning System (GPS) – Concept and their use resource mapping. LANDSAT Imagery – Definition and its use. Impact of Mining, Quarrying and Reservoirs on Environment. Natural Disasters and their mitigation.	**10 Hours**	**L2,L3, L5**

Course outcomes:

After a successful completion of the course, the student will be able to:

1. Students will able to apply the knowledge of geology and its role in Civil Engineering
2. Students will effectively utilize earth's materials such as mineral, rocks and water in civil engineering practices.
3. Analyze the natural disasters and their mitigation.
4. Assess various structural features and geological tools in ground water exploration,
   Natural resource estimation and solving civil engineering problems.
5. Apply and asses use of building materials in construction and asses their properties

Program Objectives (as per NBA)

10. *Engineering Knowledge.*
11. *Problem Analysis.*
12. *Interpretation of data.*

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum Three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- The students shall answer Five full questions selecting one full question from each module.
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. P.K. Mukerjee, "A Text Book of Geology", World Press Pvt., Ltd. Kolkatta.
2. Parbin Singh, "Text Book of Engineering and General Geology", Published by S.K. Kataria and Sons, New Dehli

Reference Books:

1. Earthquake Tips - Learning Earthquake Design and Construction - C V R Murthy Published by National Information Centre of Earthquake Engineering, Indian Institute of Technology, Kanpur.
2. Dimitri P Krynine and William R Judd, “Principles of Engineering Geology and Geotechnics”, CBS Publishers and Distributors, New Delhi.
3. K V G K Gokhale, “Principles of Engineering Geology”, BS Publications, Hyderabad.
4. M Anji Reddy, “Text book of Remote Sensing and Geographical Information System”, BS Publications, Hyderabad.
5. Ground water Assessment, development and Management by K.R. Karanth, Tata Mc Graw Hills
6. K. Todd, “Groundwater Hydrology”, Tata Mac Grow Hill, New Delhi.
7. D. Venkata Reddy, “Engineering Geology”, New Age International Publications, New Delhi.
8. S.K Duggal, H.K Pandey and N Rawal, “Engineering Geology”, McGraw Hill Education (India) Pvt, Ltd. New Delhi.
9. M.P Billings, “Structural Geology”, CBS Publishers and Distributors, New Delhi.
10. K. S. Valdiya, “ Environmental Geology”,, Tata Mc Grew Hills.
11. M. B. Ramachandra Rao, “Outlines of Geophysical Prospecting- A Manual for Geologists”, Prasaranga, University of Mysore, Myso

Course Title: MANAGEMENT THEORY – PRINCIPLES & PRATICES [As per Choice Based Credit System (CBCS) scheme] SEMESTER – III			
Subject Code	17CT36	IA Marks	40
Number of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	50	Exam Hours	03
CREDITS – 04			

Course objectives:

This course will develop a student;

1. To understand the fundamental functions & principles of management.
2. To learn about global management concept & strategies.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1		
INTRODUCTION: Evolution of Management thought, Early contribution to management – Taylor, Fayol and Elton Mayo, Scientific Movement, Administration moment and behavioral sciences movement, concept of management in development countries like USA, Japan, Britain etc., Role of Culture, technology, economics and social system.	10 Hours	**L1 L2**
Module -2		
FORM OF OWNERSHIP IN INDUSTRY: Public and Private enterprise sole proprietorship, partnership, joint stock company, co-operatives, Means of finance.	**10Hours**	**L1,L2**
Module -3		
FUNCTIONS AND PRINCIPLES OF MANAGEMENT: Planning organizing, staffing, directing and controlling, principles of management, sources of authority and responsibility. **PLANNING AND ORGANIZING:** Nature of planning, types, importance and steps	**10 hours**	**L1,L2**

in planning.		
Module -4:		
MBO principles of sound organization, types of organization, structures span of control. **STAFFING,DIRECTING AND CONTROLLING:** Selection, appraisal, training and development.	**10 Hours**	**L1,L2**
Module -5		
Leadership, motivation communication process and control, requirements of adequate control. **GLOBAL MANAGEMENT CONCEPT:** Corporate strategies e-governance, Re-engineering, benchmarking six sigma, core competencies management and society.	**10 Hours**	**L1,L2,L3**

Course outcomes:

After a successful completion of the course, the student will be able to:

1. Posses a sound ***knowledge*** of fundamental functions & principles of management.
2. To be able to adopt the global management concept & strategies

Program Objectives (as per NBA)

- o *Engineering Knowledge.*
- o *Problem Analysis.*
- o *Interpretation of data.*

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum Three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- The students shall answer Five full questions selecting one full question from each module.
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Heinz weithrich and Horold Koontz, Management – A global perspective, McGraw Hill, Int. Edition.
2. Peter F. Druker, Management: Tasks, Responsibilities, Practices, Horper Business.

Reference Books:

1. Ernest Dalc, Management Theory and Practice, McGraw Hill, Int. Edition.
2. L.M. Prasad, Principles and Practice of Management, Sultan Chand and Sons.

Course Title: SURVEYING PRATICE-I

[As per Choice Based Credit System (CBCS) scheme]
SEMESTER – III

Subject Code	17CTL37	IA Marks	40
Number of Lecture Hours/Week	03	Exam Marks	60
Total Number of Lecture Hours	42	Exam Hours	03

CREDITS – 02

Course objectives: This course will enable students to

The objectives of this course is to make students to learn:

1. *Apply the basic principles of engineering surveying and measurements*
2. *Follow effectively field procedures required for a professional surveyor*
3. *Use techniques, skills and conventional surveying instruments necessary for engineering practice.*

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
1. a) To measure distance between two points using direct ranging b) To set out perpendiculars at various points on given line using cross staff, optical square and tape. Setting out building plans	03	**L3, L4**
2. Setting out of rectangle, hexagon using tape/chain and other accessories	03	**L3**
3. Measurement of bearing of sides of a closed traverse and adjustment of closing error by Bowditch method and Transit method.	03	**L3**
4. To set out rectangles, hexagon, pentagon using tape/chain and compass.	03	**L3**
5. To determine the distance between two inaccessible points using chain/tape and compass.	03	**L4**
6. To locate points using radiation and intersection method of plane tabling.	03	**L3**
7. To solve 3-point problem in plane using Bessel's graphical solution.	03	**L3**
8. To determine difference in elevation between two points using fly levelling technique and to conduct fly back levelling using HI and Rise and Fall methods.	03	**L4**
9. To determine difference in elevation between two points using reciprocal levelling and determine the collimation error.	03	**L4**
10. To conduct profile leveling for water supply / sewage line and to draw the longitudinal section to determine the depth of cut and depth of filling for a	03	**L3**

given formation level.		
11. Demonstration of Minor instruments like Clinometer, Ceylon Ghat tracer, Box sextant, Hand level, Planimeter, nautical sextant and Pentagraph.	03	**L3**

Course outcomes:

After a successful completion of the course, the student will be able to:

1. Apply the basic principles of engineering surveying and for linear and angular measurements.
2. Comprehend effectively field procedures required for a professional surveyor.
3. Use techniques, skills and conventional surveying instruments necessary for engineering practice.[L3,L4][PO5]

Program Objectives (as per NBA)

1. *Engineering Knowledge.*
2. *Problem Analysis.*
3. *Interpretation of data.*

Question paper pattern:

- All are individual experiments.
- Instructions as printed on the cover page of answer script for split up of marks to be strictly followed.
- All exercises are to be included for practical examination.

Text Books:

1. B.C. Punmia, **"Surveying Vol.1"**, Laxmi Publications pvt. Ltd., New Delhi – 2009.
2. Kanetkar T P and S V Kulkarni , **Surveying and Levelling Part I**, Pune VidyarthiGrihaPrakashan, 1988

Reference Books:

1. S.K. Duggal, **"Surveying Vol.1"**, Tata McGraw Hill Publishing Co. Ltd. New Delhi. – 2009.
2. K.R. Arora, **"Surveying Vol. 1"** Standard Book House, New Delhi. – 2010

Course Title: CONSTRUCTION MATERIALS TESTING LAB- I

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – III

Subject Code	17CTL38	IA Marks	40
Number of Lecture Hours/Week	03	Exam Marks	60
Total Number of Lecture Hours	42	Exam Hours	03

CREDITS – 02

Course objectives:

The objectives of this course is to make students to learn:

1. Ability to apply knowledge of mathematics and engineering in calculating the mechanical properties of structural materials.
2. Ability to function on multi-disciplinary teams in the area of materials testing.
3. Ability to use the techniques, skills and modern engineering tools necessary for engineering.
4. Understanding of professional and ethical responsibility in the areas of material testing.
5. Ability to communicate effectively the mechanical properties of materials.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
1. Tension test on structural materials-mild steel and HYSD bars.	**03 Hours**	L_2, L_3, L_5
2. Compression test on structural materials-mild steel, cast iron and timber.	**03 Hours**	L_1, L_2, L_3, L_5
3. Tests on timber: Moisture content, Volume stability and Bending strength	**03 Hours**	L_1, L_2, L_3, L_5
4. Cement – Specific gravity, fineness, Setting time, Strength	**03 Hours**	L_2, L_3, L_4,L_5
5. Aggregates – Sand and Coarse Aggregate – Sieve Analysis, Strength of C.A. Hardness, Size, Shape of C.A.	**03 Hours**	L_1, L_2, L_3, L_5
6. Bricks and Blocks – Test on Table Remoulded Bricks – Testing Hollow Concrete Blocks	**03 Hours**	L_1, L_2, L_3, L_5
7. Strength tests on Roofing, flooring tiles, interlocking pavement blocks, Mosaic tiles and ceramic tiles.	**06 Hours**	L_1, L_2, L_3, L_5
8. Tests on building lime – soundness.	**03 Hours**	L_1, L_2, L_3, L_5

Course outcomes:

After successful completion of the course, the students will be able to:

1. Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion.
2. Identify, formulate and solve engineering problems of structural elements

subjected to flexure.

3. Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials.

Program Objectives (as per NBA)

1. *Engineering Knowledge.*
2. *Evaluation of mechanical properties of structural materials.*
3. *Interpretation of test results.*

Question paper pattern:

- Group experiments - Tension test, compression test, torsion test and bending test.
- Individual Experiments - Remaining tests.
- Two questions are to be set - One from group experiments and the other as individual experiment.
- Instructions as printed on the cover page of answer script for split up of marks to be strictly followed.
- All exercises are to be included for practical examination.

Reference Books:

1. A.J. Fenner-Mechanical testing of materials George newness Ltd., - 1965.
2. H.E. Davil, G.E. Troxell and C.T. Wiskocil – the testing and inspection of engineering materials McGraw Hill Book Company, 1995.
3. K.A. Holes Experimental strength of material the English Universities Press Ltd., London 1962.
4. The relevant I.S. codes
   Mild steel … IS.-1608… 1960. IS… 1521 … 1960, IS: 1633…1960. Part I and II.

Course Title: STRUCTURAL ANALYSIS

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – IV

Subject Code	17CT42	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03

CREDITS – 04

Course objectives: This course will enable students;

1. Apply knowledge of mathematics and engineering in calculating slope and deflections
2. Identify, formulate and solve engineering problems
3. Analyse structural systems and interpret data
4. Engage in lifelong learning with the advances in Structural Engineering

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1: Introduction and Analysis of Plane Trusses		
Introduction- Conditions of Equilibrium, Degrees of freedom, Determinate and indeterminate structures Analysis of plane trusses – Method of Joints and Method of Sections	**5 Hours**	**L2,L4,L5**
Determination of Deflection of determinate beams by using geometric methods- moment area and conjugate beam approach	**5 Hours**	**L2,L4,L5**
Module -2: Energy Principles and Energy Theorems		
Strain energy and complementary strain energy, strain energy due to axial load bending and shear, law of conservation of energy, principles of virtual work, Castigliano's first theorem, Belti's law, Clarke – Max well theorem of reciprocal deflection. Deflection of beams and trusses using strain energy and unit local methods	**10 Hours**	**L2, L4, L5**

Module-3: Arches and Cable Structures		
Analysis of three hinged parabolic arch with supports at same levels – determination of thrust, shear and bending moment. Analysis of cables under point load and u.d.l length of cables (supports at same level).	**10 Hours**	**L2,L4,L5**
Module -4: Deflection of Beams		
Analysis of statically indeterminate beam- Propped cantilever using consistent deformation method Analysis of continuous beams using Clapeyron's three moment equation	**10 Hours**	**L2, L4, L5**
Module -5: Deflection of Beams		
Analysis of continuous beams and simple orthogonal portal frames (without sway) by slope deflection method	**5 Hours**	**L2, L4, L5**
Analysis of continuous beams and simple orthogonal portal frames (without sway) by moment distribution method.	**5 Hours**	**L2, L4, L5**

Course outcomes:

After studying this course, students will be able;

1. Evaluate the forces in determinate trusses by method of joints and sections.
2. Evaluate the deflection of cantilever, simply supported and overhanging beams by different methods
3. Understand the energy principles and energy theorems and its applications to determine the deflections of trusses and bent frames.
4. Determine the stress resultants in arches and cables.

Program Objectives (as per NBA)

1. *Engineering Knowledge.*
2. *Problem Analysis.*
3. *Interpretation of data.*

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- ***The students shall answer Five full questions selecting one full question from each module.***
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Pundit Gupta – Structural Analysis Vol. 1 and II.
2. C.S. Reddy – Basic Structural Analysis, TMH.

Reference Books:

1. Indeterminate Structural Analysis – J. Sterling Kinney
2. Elemental Structural Analysis – Noris C H, Wilbur J.B
3. Intermediate Structural Analysis – C.K.Wang

Course Title: SURVEYING - II

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – IV

Subject Code	17CT43	IA Marks	40
Number of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	50	Exam Hours	03

CREDITS – 04

Course objectives:

The objectives of this course is to make students to learn:

1. Understand the basic principles of Surveying
2. Learn Linear and Angular measurements to arrive at solutions to basic surveying problems.
3. Employ conventional surveying methods for curve setting
4. Acquire the surveying data to compute areas and volumes and draw contours.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1		
THEODOLITE SURVEY Theodolite and types, Fundamental axes and parts of a transit theodolite, uses of theodolite, Temporary adjustments of a transit theodolite, Measurement of horizontal angles – Method of repetitions and reiterations, Measurements of vertical angles, Prolonging a straight line by a theodolite in adjustment and theodolite not in adjustment	**6 Hours**	**L1, L2**
PERMANENT ADJUSTMENT OF DUMPY LEVEL AND TRANSIT THEODOLITE: Interrelationship between fundamental axes for instrument to be in adjustment and step by step procedure of obtaining permanent adjustments	**4 Hours**	**L1, L2**

Module -2		
TRIGONOMETRIC LEVELLING Determination of elevation of objects when the base is accessible and inaccessible by single plane and double plane method, Distance and difference in elevation between two inaccessible objects by double plane method. Salient features of Total Station, Advantages of Total Station over conventional instruments, Application of Total Station.	**10 Hours**	**L1, L2**
Module -3		
TACHEOMETRY Basic principle, Types of tacheometric survey, Tacheometric equation for horizontal line of sight and inclined line of sight in fixed hair method, Anallactic lens in external focusing telescopes, Reducing the constants in internal focusing telescope, Moving hair method and tangential method, Subtance bar, Beaman stadia arc.	**5 Hours**	**L1,L2**
CURVE SETTING (Simple curves) Curves – Necessity – Types, Simple curves, Elements, Designation of curves, Setting out simple curves by linear methods, Setting out curves by Rankines deflection angle method.	**5 Hours**	**L1,L2**
Module -4		
CURVE SETTING (Compound and Reverse curves) Compound curves, Elements, Design of compound curves, Setting out of compound curves, Reverse curve between two parallel straights (Equal radius and unequal radius).	**5 Hours**	**L1,L2**

CURVE SETTING (Transition and Vertical curves) Transition curves, Characteristics, Length of Transition curve, Setting out cubic Parabola and Bernoulli's Lemniscates, Vertical curves – Types – Simple numerical problems.	**5 Hours**	**L1,L2**
Module -5		
AREAS AND VOLUMES Calculation of area from cross staff surveying, Calculation of area of a closed traverse by coordinates method. Planimeter – principle of working and use of planimeter to measure areas, digital planimter, Computations of volumes by trapezoidal and prismoidal rule, Capacity contours	**10 Hours**	**L1,L2**

Course outcomes:

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

1. Possess a sound knowledge of fundamental principles of surveying
2. Measurement of vertical and horizontal plane, linear and angular dimensions to arrive at solutions to basic surveying problems
3. Apply the knowledge of conventional surveying methods for curve setting
4. Analyse the data to compute areas and volumes and draw contours.

Program Objectives (as per NBA)

1. *Engineering Knowledge.*
2. *Problem Analysis.*
3. *Interpretation of data.*

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum Three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- The students shall answer Five full questions selecting one full question from each module.
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. '**Surveying'** Vol 2 and Vol 3 - B. C. Punmia, Laxmi Publications
2. **'Plane Surveying'** A. M. Chandra – New age international (P) Ltd
3. **'Higher Surveying'** A.M. Chandra New age international (P) Ltd

Reference Books:

1. **Fundamentals of Surveying** - Milton O. Schimidt – Wong, Thomson Learning.
2. **Fundamentals of Surveying** - S.K. Roy – Prentice Hall of India
3. **Surveying**, Arther Bannister et al., Pearson Education, India

Course Title: Concrete Technology

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – IV

Subject Code	17CV/CT44	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03

CREDITS – 04

Course objectives: This course will enable students;

1. Recognize the importance of material characteristics and their contributions to strength development in Concrete
2. Proportion ingredients of Concrete to arrive at most desirable mechanical properties of Concrete.
3. Ascertain and measure engineering properties of concrete in fresh and hardened state which meet the requirement of real time structures.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module-1: Concrete Ingredients		
Cement – Cement manufacturing process, steps to reduce carbon footprint, chemical composition and their importance, hydration of cement, types of cement. Testing of cement. Fine aggregate: Functions, requirement, Alternatives to River sand, M-sand introduction and manufacturing. Coarse aggregate: Importance of size, shape and texture. Grading and blending of aggregate. Testing on aggregate, requirement. Recycled aggregates Water – qualities of water. Chemical admixtures – plasticizers, accelerators, retarders and air entraining agents. Mineral admixtures – Pozzolanic and cementitious materials, Fly ash, GGBS, silica fumes, Metakaolin and rice husk ash.	**10 Hours**	**L1,L2,L3**

Module -2: Fresh Concrete		
Workability-factors affecting workability. Measurement of workability–slump, Compaction factor and Vee-Bee Consistometer tests, flow tests. Segregation and bleeding. Process of manufacturing of concrete- Batching, Mixing, Transporting, Placing and Compaction. Curing – Methods of curing – Water curing, membrane curing, steam curing, accelerated curing, self-curing. Good and Bad practices of making and using fresh concrete and Effect of heat of hydration during mass concreting at project sites.	**10 Hours**	**L1,L2,L3**
Module -3: Hardened Concrete		
Factors influencing strength, W/C ratio, gel/space ratio, Maturity concept, Testing of hardened concrete, Creep –factors affecting creep. Shrinkage of concrete – plastic shrinking and drying shrinkage, Factors affecting shrinkage. Definition and significance of durability. Internal and external factors influencing durability, Mechanisms- Sulphate attack – chloride attack, carbonation, freezing and thawing. Corrosion, Durability requirements as per IS-456, Insitu testing of concrete- Penetration and pull out test, rebound hammer test, ultrasonic pulse velocity, core extraction – Principal, applications and limitations.	**10 Hours**	**L1,L2,L3**
Module -4: Concrete Mix Proportioning		
Concept of Mix Design with and without admixtures, variables in proportioning and Exposure conditions, Selection criteria of ingredients used for mix design, Procedure of mix	**10 Hours**	**L1, L2, L3, L4**

proportioning. Numerical Examples of Mix Proportioning using IS-10262		
Module -5:		
RMC- manufacture and requirement as per QCI-RMCPCS, properties, advantages and disadvantages. Self-Compacting concrete- concept, materials, tests, properties, application and typical mix Fiber reinforced concrete - Fibers types, properties, application of FRC. Light weight concrete-material properties and types. Typical light weight concrete mix and applications	**10 Hours**	**L1, L2, L3, L4**

Course outcomes:

After studying this course, students will be able;

CO1: Relate material characteristics and their influence on microstructure of concrete. (L2,L3)(PO1)

CO 2: Distinguish concrete behaviour based on its fresh and hardened properties. [L2, L4] (PO1, PO2)

CO 3: Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes. [L3] (PO1, PO2, PO3)

Program Objectives (as per NBA)

1. *Engineering Knowledge.*
2. *Problem Analysis.*
3. *Interpretation of data.*

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- ***The students shall answer Five full questions selecting one full question from each module.***
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Neville A.M. “Properties of Concrete”-4th Ed., Longman.
2. M.S. Shetty, Concrete Technology - Theory and Practice Published by S. Chand and Company, New Delhi.
3. Kumar Mehta. P and Paulo J.M. Monteiro “Concrete-Microstructure, Property and Materials”, 4th Edition, McGraw Hill Education, 2014
4. A.R. Santha Kumar, “Concrete Technology”, Oxford University Press, New Delhi (New Edition)

Reference Books:

1. M L Gambir, “Concrete Technology”, McGraw Hill Education, 2014.
2. N. V. Nayak, A. K. Jain Handbook on Advanced Concrete Technology, ISBN: 978-81- 8487-186-9
3. Job Thomas, “Concrete Technology”, CENGAGE Learning, 2015
4. IS 4926 (2003): Code of Practice Ready-Mixed Concrete [CED 2: Cement and Concrete]
5. Criteria for RMC Production Control, Basic Level Certification for Production Control of Ready Mixed Concrete-BMTPC\
6. Specification and Guidelines for Self-Compacting Concrete, EFNARC, Association House

Course Title: BUILDING CONSTRUCTION [As per Choice Based Credit System (CBCS) scheme] SEMESTER – IV			
Subject Code	17CT45	IA Marks	40
Number of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	50	Exam Hours	03
CREDITS – 04			

Course objectives:
This course will enable students to;
1. In investigation of soil condition, Deciding suitable foundation for different structures
2. In supervision of different types of masonry and suitable lintel, chejja and canopy
3. In selection of materials, design and supervision of suitable type of floor, roof and stairs.
4. To gain knowledge about doors, windows, plastering, painting, damp proofing, scaffolding, shoring, underpinning and to take suitable engineering measures.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1		
FOUNDATION: Preliminary Investigation of Soil, **Bearing Capacity of Soil** – Introduction, Safe Bearing Capacity of Soil, Allowable Bearing Capacity of Soil, Determination of Bearing Capacity by Plate Load Test and by method of dropping weight	**4 Hours**	**L1, L2,L4**
Classification of Foundations: Introduction to different types of foundation, Masonry footings, Isolated footings, Combined and Strap RCC footings, Raft footing, Grillage foundation, Pile foundations (Friction and Load bearing piles), Foundation in black cotton soils.	**6 Hours**	**L1, L2**

Module -2		
BRICK MASONRY: Definition of terms used in masonry, Bonds in brickwork, English Bond, Flemish Bond, Reinforced brickwork, Hollow Block construction, Damp Proof construction, Masonry arches classification, Stability of an arch, Joints in Masonry, Load Bearing and partition walls.	**5 Hours**	**L1,L2,L3**
STONE MASONRY: Rubble Masonry**,** Coursed Rubble Masonry**,** Uncoursed rubble masonry**,** Random rubble masonry**,** Ashlar Masonry**.** Shoring, Underpinning, Scaffolding	**5 Hours**	**L1,L2,L3**
Module -3		
LINTELS, CHEJJA, CANOPY BALCONY: Lintels - Types and classifications**,** Functions & Method of construction. Chejja -Types and classifications**,** Functions & Method of construction. Canopy -Types and classifications**,** Functions & Method of construction.	**2 Hours**	**L2, L3**
ROOFS: Flat Roof (R.C.C), Sloped roof (R.C.C. and Tile roof), Lean to roof**,** Wooden truss (King post and queen post trusses)**,** Steel trusses- for various spans up to 15m using structural steel sections including Tubular and Hollow sections with Details such as purlins, roof coverings and joints. Weather proof course for RCC Roof. Roof Coverings.	**4 Hours**	**L2, L3**
STAIRS: Types (Classification) and Technical terms in stairs, Requirements of a good stair. Geometric Design of RCC Dog Legged and open well stairs (Plan and sectional elevation of stairs)	**4 Hours**	**L2, L3,L4**

Module -4		
PLASTERING: Purpose of plastering, Materials of plastering, Lime mortar, Cement Mortar Methods of plastering, Lath plastering **FLOORING:** Types of flooring (Materials and method of laying), Granolithic, Mosaic, Ceramic, Marble, Polished granite, Industrial flooring **DOORS AND WINDOWS:** Door Types: Paneled doors, Glazed doors, Flush doors, Collapsible and rolling shutters, Louvered doors, Revolving, sliding and swing doors Windows Types: Paneled, Glazed, Bat window, Dormer window, Louvered and corner window, Ventilators	**10Hours**	**L2, L3**
Module -5:		
PAINTING: Purpose, Types, Application of paints to new and old surfaces, Distemper, Plastic emulsion, Enamel, Powder coated painting to walls and iron and steel surfaces, Polishing of wood surface **INTRODUCTION TO COST EFFECTIVE CONSTRUCTION:** Necessity, Advantages, Materials and composites, Stabilized and bocks, Precast roofing elements, L-Panel, Channel section, Micro concrete tiles, Pre cast doors and windows (Pre cast frames and shutters), Pre fabrication techniques **FORM WORK:** Form work details, RCC columns, Beams, Floors, Slip forming	**10Hours**	**L1,L2,L3**
Course outcomes: After a successful completion of the course, the student will be able to: 1. Select suitable materials and adopt suitable construction techniques for buildings 2. Adopt suitable cost effective construction techniques to enhance durability of buildings.		
Program Objectives (as per NBA) ***1.*** *Engineering Knowledge.* ***2.*** *Problem Analysis.* ***3.*** *Interpretation of data.*		

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum Three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- The students shall answer Five full questions selecting one full question from each module.
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Building Construction by S.C. Rangwala
2. Building Construction by Sushil Kumar
3. Building Construction by Punmia B.C.

Reference Books:

1. Construction Technology Vol. 1 to Vol. 4 by Chutley
2. Construction Technology Vol. 1 and Vol. 2 by Mckay.

Course Title: FINANCIAL AND COST ACCOUNTING

[As per Choice Based Credit System (CBCS) scheme]
SEMESTER – IV

Subject Code	17CT46	IA Marks	40
Number of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	50	Exam Hours	04

CREDITS – 04

Course objectives:
This course will enable students;
1. To understand the basic concepts of finance and cost accounting
2. To comprehend the methods used to assess the financial accounting and cost of different projects
3. To evaluate the financial position to investment in a project by various methods

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1		
Financial Accounting: Basic Concept – Definitions of Book Keeping and Accounting – Objectives and Functions of Accounting – Types of Accounts – Rules of Debit and Credit, Journal – Ledger – Trial Balance. Preparation of Final Accounts – Adjusting Entry – Trading, Profit and Loss Account and Balance Sheet.	**10 Hours**	**L2,L3,L4**
Module -2		
Budget - Meaning and definitions – Preparation of Functional Budgets – Cash Budget - Sales Budget – Purchases and Production Budget – Flexible Budget. **Capital Budgeting** – Nature, Importance and Objectives – Process involved in Capital Budgeting – Kinds of Capital Budgeting Decision	**10 Hours**	**L1,L2**

Module -3		
Methods of Evaluating Investment Proposals – Payback method – Payback profitability method – Discounted Cash Flow method – Net present – Value method	**10 Hours**	**L2, L3, L5**
Module -4		
Costing concepts – Meaning and Definition – Objectives – Difference between Cost of Financial Accounting Cost Classification Statement of Cost and Estimation – Methods of Costing – Job Costing and Process Costing	**10 Hours**	**L1,L2**
Module -5:		
Project Accounts – Preparation of Contract Accounts for each project – Methods of Recording and Reporting Site Accounts to Project Office and from Project Office to Head Office.	**10 Hours**	**L1,L2**

Course outcomes:

After a successful completion of the course, the student will be able to:

1. Apply the knowledge of concepts of finance and cost accounting in construction.
2. Analyze the financial accounting and cost of construction projects.
3. Assess the financial position to investment in a project

Program Objectives (as per NBA)

1. *Engineering Knowledge.*
2. *Problem Analysis.*
3. *Interpretation of data.*

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum Three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- The students shall answer Five full questions selecting one full question from each module.
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Reference Books:

1. Bhattacharya S.K. and Dearden John, “Accounting for Management”, Vani Educational Books, Mumbai (Latest Edition).
2. Saravanvel P. “Management Accounting” Principles and Practices.
3. B.S. Raman “Accountancy”.
4. Prof. K.S. Nagapathi, “Management Accounting” R. Chand and Co., New Delhi.
5. Kuchal S.C. “Corporate Finance”, Tata McGraw Hill, New Delhi.

Course Title: SURVEYING PRATICE-II

[As per Choice Based Credit System (CBCS) scheme]
SEMESTER – IV

Subject Code	17CTL47	IA Marks	40
Number of Lecture Hours/Week	03	Exam Marks	60
Total Number of Lecture Hours	42	Exam Hours	03

CREDITS – 02

Course objectives: This course will enable students to

The objectives of this course is to make students to learn:

1. *Apply the basic principles of engineering surveying and measurements*
2. *Follow effectively field procedures required for a professional surveyor*
3. *Use techniques, skills and conventional surveying instruments necessary for engineering practice.*

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
1. Measurement of horizontal angles with method of repetition and reiteration using theodolite.	03	**L3, L4**
2. Measurement of vertical angles using theodolite.	03	**L3,L4**
3. To determine the elevation of an object using single plane method when base is accessible and inaccessible.	03	**L3, L4**
4. To determine the distance and difference in elevation between two inaccessible points using double plane method.	03	**L3**
5. To determine the tacheometric constants using horizontal and inclined line of sight.	03	**L3, L4**
6. To set out simple curves using linear methods – perpendicular offsets from long chord and offsets from chords produced.	03	**L3, L4**
7. To set out simple curves using Rankine's deflection angles method.	03	**L3, L4**
8. To set out compound curve with angular methods with suing theodolite only.	03	**L3, L4**

9. To set out the center line of a simple rectangular room suing offset from base line	03	**L3, L4**
10. To set out center lines of columns of a building using two base lines at right angles	03	**L3, L4**
11. Calculation of area from cross staff surveying	03	**L3, L4**
12. Calculation of area of a closed traverse by coordinates method	03	**L3, L4**
13. Demonstration**:** Exposure to use of Total Station. Traversing, Longitudinal sections, Block levelling	03	**L1, L2**
14. Demonstration**:** Usage of relevant softwares for preparation of the contour drawings.	03	**L1, L2**

Course outcomes:

After a successful completion of the course, the student will be able to:

1. Apply the basic principles of engineering surveying and for linear and angular measurements.
2. Comprehend effectively field procedures required for a professional surveyor.
3. Use techniques, skills and conventional surveying instruments necessary for engineering practice.[L3,L4][PO5]

Program Objectives (as per NBA)

1. *Engineering Knowledge.*
2. *Problem Analysis.*
3. *Interpretation of data.*

Question paper pattern:

- All are individual experiments.
- Instructions as printed on the cover page of answer script for split up of marks to be strictly followed.
- All exercises are to be included for practical examination.

Text Books:

1. B.C. Punmia, **"Surveying Vol.1"**, Laxmi Publications pvt. Ltd., New Delhi – 2009.
2. Kanetkar T P and S V Kulkarni , **Surveying and Levelling Part I**, Pune Vidyarthi Griha Prakashan, 1988

Course Title: CONSTRUCTION MATERIALS TESTING LAB- II

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – IV

Subject Code	17CTL48	IA Marks	40
Number of Lecture Hours/Week	03	Exam Marks	60
Total Number of Lecture Hours	42	Exam Hours	03

CREDITS – 02

Course objectives:

The objectives of this course is to make students to learn:

1. Ability to apply knowledge of mathematics and engineering in calculating the mechanical properties of structural materials.
2. Ability to function on multi-disciplinary teams in the area of materials testing.
3. Ability to use the techniques and skills necessary for selecting suitable structural materials.
4. Understanding of professional and ethical responsibility in the areas of material testing.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
1. CEMENT: Normal consistency, Soundness by Autoclave method, Compression strength test.	**03 Hours**	L_2, L_3, L_5
2.AGGREGATES: **Coarse Aggregate-**Crushing, abrasion, impact and Specific gravity and water absorption. **Fine Aggregate-** Specific gravity and water absorption.	**06 Hours**	L_1, L_2, L_3, L_5
3. Mix Proportioning of Concrete using IS-10262	**06 Hours**	L_1, L_2, L_3, L_5
4. FRESH CONCRETE: Workability – slump, Compaction factor and Vee Bee tests.	**06 Hours**	L_1, L_2, L_3, L_5
5. Self-Compacting Concrete: Typical Mix by EFNARC, Workability- Slump Flow Test, V Funnel Test, L-Box test	**06 Hours**	L_1, L_2, L_3, L_5
6.HARDENED CONCRETE: Compression Strength and Split tensile tests.	**06 Hours**	L_1, L_2, L_3, L_5
7. BITUMINOUS MATERIALS AND MIXES: Specific Gravity, Penetration, Ductility, Softening point, Flash and fire point, Viscosity. Marshall Stability tests	**06 Hours**	L_1, L_2, L_4, L_5
8.SUBGRADE SOIL: CBR Test	**03 Hours**	L_2, L_3, L_4, L_5

Course outcomes:

After successful completion of the course, the students will be able to:

1. Reproduce the basic knowledge of mathematics and engineering in finding the strength in compression and split tensile strength of hardened concrete
2. Identify and compare suitable structural materials used in construction.
3. Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials.

Program Objectives (as per NBA)

1. *Engineering Knowledge.*
2. *Evaluation of mechanical properties of structural materials.*
3. *Interpretation of test results.*

Question paper pattern:

- Group experiments - Compression Strength, Split tensile tests.
- Individual Experiments - Remaining tests.
- Two questions are to be set - One from group experiments and the other as individual experiment.
- Instructions as printed on the cover page of answer script for split up of marks to be strictly followed.
- All exercises are to be included for practical examination.

Reference Books:

1. Relevant IS Codes, EFNARC code and IRC Codes
2. Highway Material Testing Laboratory Manual – New Chand and Bros.
3. M.S. Shetty, Concrete Technology - Theory and Practice Published by S. Chand and Company, New Delhi.
4. M.L. Gambhir – Concrete Manual – Dhanpat Rai and sons New – Delhi.

Course Title: Design of RC Structural Elements

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – V

Subject Code	**17CT51**	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	**03**
CREDITS – 04		Total Marks-100	

Course objectives: This course will enable students;

1. Identify, formulate and solve engineering problems of RC elements subjected to different kinds of loading.

2. Follow a procedural knowledge in designing various structural RC elements.

3. Impart the culture of following the codes for strength, serviceability and durability as an ethics.

4. Provide knowledge in analysis and design of RC elements for the success in competitive examinations.

Modules	**Teaching Hours**	**Revised Bloom's Taxonomy (RBT) Level**
Module -1:		
Introduction to Limit State Design and Serviceability: Introduction to working stress method, Difference between Working stress and Limit State Method of design, Modular Ratio and Factor of Safety. Philosophy and principle of limit state design with assumptions. Partial Safety factors, Characteristic load and strength. Stress block parameters, concept of balanced section, under reinforced and over reinforced section. Limiting deflection, short-term deflection, long-term deflection, Calculation of deflection of singly reinforced beam only. Cracking in reinforced concrete members, calculation of crack width of singly reinforced beam. Side face reinforcement, slender limits of beams for stability.	**12 Hours**	**L1,L2**
Module -2:		
Limit State Analysis of Beams: Analysis of singly reinforced, doubly reinforced and flanged beams for flexure and shear.	**08 Hours**	**L2,L4**
Module-3:		
Limit State Design of Beams: Design of singly and doubly reinforced beams, Design of flanged beams for shear, design for combined bending and torsion as per IS-456	**10 Hours**	**L2,L4**

Module -4:		
Limit State Design of Slabs and Stairs: Introduction to one way and two-way slabs, Design of cantilever, simply supported and one-way continuous slab. Design of two-way slabs for different boundary conditions. Design of dog legged and open well staircases. Importance of bond, anchorage length and lap length.	**10 Hours**	**L2,L4**
Module -5:		
Limit State Deign of Columns and Footings: Analysis and design of short axially loaded RC column. Design of columns with uniaxial and biaxial moments, Design concepts of the footings. Design of Rectangular and square column footings with axial load and also for axial load & moment	**10 Hours**	**L2,L4**

Course outcomes:

After studying this course, students will be able to:

1. Understand the design philosophy and principles.
2. Solve engineering problems of RC elements subjected to flexure, shear and torsion.
3. Demonstrate the procedural knowledge in designs of RC structural elements such as slabs, columns and footings.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Unnikrishnan Pillai and Devdas Menon, “Reinforced Concrete Design”, McGraw Hill, New Delhi
2. Subramanian, “Design of Concrete structures”, Oxford university Press
3. H J Shah, “Reinforced Concrete Vol 1 (Elementary Reinforced Concrete)”, Charotar Publishing House Pvt. Ltd.

Reference Books:

1. P C Varghese, “Limit State design of reinforced concrete” , PHI, New Delhi
2. W H Mosley, R Husle, J H Bungey, “Reinforced Concrete Design”, MacMillan Education, Palgrave publishers
3. Kong and Evans, “Reinforced and Pre-Stressed Concrete”, Springer Publications
4. A W Beeby and Narayan R S, “Introduction to Design for Civil Engineers”, CRC Press
5. Robert Park and Thomas Paulay, “Reinforced Concrete Structures”, John Wiley & Sons, Inc.

Course Title: Construction Economics and Finance [As per Choice Based Credit System (CBCS) scheme] SEMESTER – V			
Subject Code	17CT52	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03
CREDITS – 04		Total Marks-100	

Course objectives: This course will enable students;

1. To understand the importance of financial management in construction.
2. To determine flow statements in construction economics.
3. To ascertain and measure the financial aspect of construction projects.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
INTRODUCTION Engineering economics, types of economics, Support Matters of Economy as related to Engineering, Market demand and supply, Choice of Technology, Theory of Production, Economics of Scale, Theory of Costs and Break Even Analysis.	**10 Hours**	**L1,L2,L3**
Module -2:		
CONSTRUCTION ECONOMICS Role of Civil Engineering in Industrial Development, Construction development in Housing, transport and other infrastructures, Economics of ecology, environment, energy resources. Construction workers - Urban Problems, Poverty, Unemployment Effects on economics due to migration of construction workers to urban area.	**10 Hours**	**L1,L2**
Module-3:		
CAPITAL STRUCTURE The need for financial management, Types of financing - short term borrowing, long term borrowing, leasing, equity financing – Internal generation of funds, External commercial borrowings, Assistance from government budgeting support and international finance corporations.	**10 Hours**	**L2,L3**

Module -4:		
FINANCIAL ANALYSIS Fund Flow and Cash Flow statements (Simple Problems), Financial Analysis – Meaning and Types, Tools and Techniques, Ratio Analysis, Types of Ratios, Profitability Ratio, Turnover ratio, Financial ratio (Balance sheet ratios) (Simple problems).	**10 Hours**	**L2,L3,L4,L5**
Module -5:		
WORKING CAPITAL MANAGEMENT Working Capital Management – Concept of Working Capital – Factors Affecting Working Capital – Sources of Working Capital – Forecasting The Working Capital Requirements. Liquidity and Profitability, Determination of Working Capital-Theories and Approaches	**10 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to:

1. Recognize the importance of working capital management and engineering economics.
2. Prepare fund flow and cash flow statements and implement in construction accounting.
3. Analyze and evaluate financial stature of construction projects.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*

Question paper pattern:

- The question paper will have ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- ***The students shall answer Five full questions selecting one full question from each module.***
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Reference Books:

1. Urban Economics by Warneer Z Hirsch, Macmillan, New York.
2. Financial Management, I.M. Pandey
3. P. Saravanavelu, “Management Accounting - Principles and Practice”.
4. Prof. K.S. Nagapathi “Management Accounting”, R. Chand & Co., New Delhi.

Course Title: Geotechnical Engineering

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – V

Subject Code	17CT53	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03
CREDITS – 04		Total Marks- 100	

Course objectives: This course will enable students;

1. To understand the significance of engineering properties of soils and their relation to the formation of soils.
2. To comprehend the procedural knowledge of compaction & consolidation of soils and analyze the effects of permeability on soil behavior.
3. To apply the knowledge of shear strength of soils in the actual field conditions with respect to drainage conditions available in the field.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
INTRODUCTION Introduction, origin and formation of soil, Phase Diagram, phase relationships, definitions and their interrelationships.	**03 Hours**	**L1,L2**
INDEX PROPERTIES Determination of Index Properties -Specific gravity, water content, in-situ density and particle size analysis (sieve and sedimentation analysis)Atterberg'sLimits, consistency indices, relative density, activity of clay, Plasticity chart, unified and BIS soil classification.	**07 Hours**	**L1,L2,L3**

Module -2:		
SOIL STRUCTURE AND CLAY MINERALOGY Single grained, honey combed, flocculent and dispersed structures, Valence bonds, Soil-Water system, Electrical diffuse double layer, adsorbed water, base-exchange capacity, Isomorphous substitution. Common clay minerals in soil and their structures- Kaolinite, Illite and Montmorillonite and their application in Engineering.	**05 Hours**	**L1,L2,L3**
COMPACTION OF SOILS Definition, Principle of compaction, Standard and Modified proctor's compaction tests, factors affecting compaction, effect of compaction on soil properties, Field compaction control - compactive effort & method of compaction, lift thickness and number of passes, Proctor's needle, Compacting equipment's and their suitability.	**05 Hours**	**L1,L2,L3**
Module-3:		
FLOW THROUGH SOILS Darcy's law- assumption and validity, coefficient of permeability and its determination (laboratory and field), factors affecting permeability, permeability of stratified soils, Seepage velocity, superficial velocity and coefficient of percolation, Capillary Phenomena. SEEPAGE ANALYSIS- Laplace equation, assumptions, limitations and its derivation.	**06 Hours**	**L1,L2,L3**
EFFECTIVE STRESS ANALYSIS Geostatic stresses, Effective stress concept-total stress, effective stress and Neutral stress and impact of the effective stress in construction of structures, quick sand phenomena.	**04 Hours**	**L2,L3,L4**

Module -4:		
CONSOLIDATION OF SOIL Definition, Mass-spring analogy, Terzaghi's one dimensional consolidation theory - assumption and limitations. Derivation of Governing Differential Equation. Pre-consolidation pressure and its determination by Casagrande's method. Over consolidation ratio, normally consolidated, under consolidated and over consolidated soils.	**05 Hours**	**L2,L3**
Consolidation characteristics of soil (Cc, av, mv and Cv. Laboratory one dimensional consolidation test, characteristics of e-log(σ') curve, Determination of consolidation characteristics of soils- compression index and coefficient of consolidation (square root of time fitting method, logarithmic time fitting method). Primary and secondary consolidation.	**05 Hours**	**L2,L3**
Module -5:		
SHEAR STRENGTH OF SOIL Concept of shear strength, Mohr–Coulomb Failure Criterion, Modified Mohr–Coulomb Criterion, Concept of pore pressure, Total and effective shear strength parameters, factors affecting shear strength of soils. Thixotrophy and sensitivity, Measurement of shear strength parameters - Direct shear test, unconfined compression test, triaxial compression test and field Vane shear test, Test under different drainage conditions. Total and effective stress paths.	**10 Hours**	**L2,L3,L4**

Course outcomes:

After studying this course, students will be able to;

1. Describe engineering properties of soils and their relation to the formation of soils.
2. Illustrate the procedural knowledge of compaction & consolidation of soils and predict the effects of permeability on soil behavior.
3. Solve practical problems related to shear strength of soils in the actual field conditions.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- ***The students shall answer Five full questions selecting one full question from each module.***
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Reference Books:

1. Alam Singh and Chowdhary G.R. (1994), "Soil Engineering in Theory and Practice", CBS Publishers and Distributors Ltd., New Delhi.
2. Bowles, J.E. (1996), "Foundation Analysis and Designs", 5th Edition, McGraw Hill Publishing Co., New York.
3. Murthy, V.N.S. (1996), "Soil Mechanics and Foundation Engineering", 4th Edition, UBS Publishers and Distributors, New Delhi.
4. Punmia, B.C. (2003), "Soil Mechanics and Foundations", Laxmi Publishing Co., New Delhi.
5. Gopal Ranjan and Rao, A.S.R. (2000), "Basic and Applied Soil Mechanics", New Age International (P) Ltd., New Delhi.
6. Narasimha Rao A.V., and Venkatramaiah C. (2000), "Geotechnical Engineering", University press (India) Ltd., Hyderabad.

Course Title: Transportation Engineering [As per Choice Based Credit System (CBCS) scheme] SEMESTER – V			
Subject Code	17CT54	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03
CREDITS – 04		Total Marks- 100	

Course objectives: This course will enable students;

1. To understand the history and development, role of railways, railway planning and development based on essential criteria's.
2. To learn different types of structural components, engineering properties of the materials in roads and railway infrastructure.
3. To calculate the material quantities required for construction of roads and design geometric elements of railway system.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
PRINCIPLES OF TRANSPORTATION ENGINEERING Importance of Transportation, Different modes of transportation, characteristics and comparison of different modes, Jayakar committee recommendations and implementation.	**03 Hours**	**L1,L2**
HIGHWAY DEVELOPMENT AND PLANNING Road Types and classification, road patterns. Planning surveys, Master plan - saturation system of road planning, phasing road development programme Road Development in India, 1st, 2nd & 3rd 20-year road development plan and problems only on 3rd 20-year road plan. Present scenario of road development in India (NHDP & PMGSY) and in Karnataka (KSHIP & KRDCL) – problems on best alignment among alternate proposals and phasing, Road Development Plan Vision 2021.	**07 Hours**	**L2,L3**

Module -2:		
HIGHWAY ALIGNMENT AND SURVEYS Ideal alignment, factors affecting alignment, engineering surveys for new and realignment projects.	**03 Hours**	**L1,L2**
HIGHWAY GEOMETRIC DESIGN Importance, Factors controlling the design of geometric elements, highway cross section elements – pavement surface characteristics, camber, width of carriageway, shoulder width, formation width, right of way, typical cross section of roads. Sight distance, Types and importance - Design of horizontal and vertical alignment – Numerical problems on above (No derivation of formulae)	**07 Hours**	**L2,L3**
Module -3:		
PERMANENT WAY Role of railways in transportation, Indian Railways, selection of routes. Introduction to Permanent Way, requirements for an ideal permanent way, typical cross sections of single and double line B.G. tracks – in cutting, embankment and electrified tracks. Gauges and types of gauges with dimensions. Coning of wheels and tilting of rails. Track stresses in rails, sleepers, ballast and subgrade. Problems on these. Rails functions requirements, types of rail sections, length of rails, defects in rails. Wear on rails, rail joints, welding of rails, creep of rails.	**10 Hours**	**L1,L2,L3,L4**

Module-4:		
BALLAST AND SLEEPERS Functions, requirements, types, track fittings and fasteners, calculation of quantity of materials needed for laying a track. Traction and tractive resistances, tractive power, Hauling capacity. Problems on above. **GEOMETRIC DESIGN OF TRACK** Necessity of Geometric Design of railway track, gradient and types of gradient. Speed of train, curve, transition curve, super elevation, cant - deficiency, negative cant- speed calculation based on Indian Railways Formulae for High speed tracks only-problems on above.	**10 Hours**	**L1,L2,L3,L4**

Module -5:		
POINTS AND CROSSING Necessity and its components, turnout, design of turnout, Types of switches, crossings, track junctions. Stations and yards, marshalling yard, signalling and interlocking, track defects, track maintenance, level crossing, Indian Railway standards (no derivations, only relevant problems). Equipment in stations and yards such as turn-table, water columns, fouling marks, buffer stops etc.	**10 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to;

1. Identify different modes of transportation and planning stages for highways.
2. Acquires capability of choosing alignment and design geometric aspects of railway system, runway and taxiway.
3. Suggest and estimate the material quantity required for laying a railway track and will be able to determine the hauling capacity of a locomotive.

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- ***The students shall answer Five full questions selecting one full question from each module.***
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Highway Engineering- Khanna, S.K. & Justo, C.E.G., Nem Chand & Bros, Roorkee (2003).
2. Highway Engineering- Kadiyali, L.R., Khanna Publishers, New Delhi.
3. Railway Engineering- Saxena and Arora, Dhanpat Rai and Sons, New Delhi.
4. Railway Engineering- Satish Chandra & Agarwal, M.M., Oxford University Press, New Delhi
5. Indian railway Track, Agarwal M.M, Jaico Publications, Bombay.

Course Title: Air Pollution and Control

Professional Elective-1

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – V

Subject Code	17CT551	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03
CREDITS – 03		Total Marks- 100	

Course objectives: This course will enable students;

1. Study the sources and effects of air pollution
2. Learn the meteorological factors influencing air pollution.
3. Analyze air pollutant dispersion models
4. Illustrate particular and gaseous pollution control methods.

Modules	**Teaching Hours**	**Revised Bloom's Taxonomy (RBT) Level**
Module -1:		
Introduction: Definition, Sources, classification and characterization of air pollutants. Effects of air pollution on health, vegetation & materials. Types of inversion, photochemical smog.	**08 Hours**	**L1,L2**
Module -2:		
Meteorology: Temperature lapse rate & stability, wind velocity & turbulence, plume behavior, measurement of meteorological variables, wind rose diagrams, Plume Rise, estimation of effective stack height and mixing depths. Development of air quality models-Gaussian dispersion model.	**08 Hours**	**L1,L2,L3**
Module -3:		
Sampling: Sampling of particulate and gaseous pollutants (Stack, Ambient & indoor air pollution), Monitoring and analysis of air pollutants (PM2.5, PM10, SOX,NOX, CO, NH3)	**08 Hours**	**L2,L3,L4**
Module -4:		
Control Techniques: Particulate matter and gaseous pollutants- settling chambers, cyclone separators, scrubbers, filters & ESP.	**08 Hours**	**L3,L4**
Module -5:		
Air pollution due to automobiles, standards and control methods. Noise pollution causes, effects and control, noise standards. Environmental issues, global episodes, laws, acts, protocols	**08 Hours**	**L3,L4**

Course outcomes:

After studying this course, students will be able;

1. Identify the major sources of air pollution and understand their effects on health and environment.
2. Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models.
3. Ascertain and evaluate sampling techniques for atmospheric and stack pollutants.
4. Choose and design control techniques for particulate and gaseous emissions.

Question paper pattern:

- The question paper will have Ten questions, each fullquestion carrying 16 marks.
- There will be two full questions (with a maximum three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- ***The students shall answer Five full questions selecting one full question from each module.***
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. M. N. Rao and H V N Rao, "Air pollution", Tata Mc-Graw Hill Publication.

2. H. C. Perkins, "Air pollution". Tata McGraw Hill Publication

3. Mackenzie Davis and David Cornwell, "Introduction to Environmental Engineering" McGraw-Hill Co.

Reference Books:

1. Noel De Nevers, "Air Pollution Control Engineering", Waveland Pr Inc.

2. Anjaneyulu Y, "Text book of Air Pollution and Control Technologies", Allied Publishers

Course Title: Advance Surveying Professional Elective-1 [As per Choice Based Credit System (CBCS) scheme] SEMESTER – V			
Subject Code	17CT552	IA Marks	40
Number of Lecture Hours/Week	03	Exam Marks	60
Total Number of Lecture Hours	40	Exam Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students to:

1. Gain the knowledge of principles to arrive at solutions to surveying problems.
2. Analyze spatial data using appropriate computational and analytical techniques.
3. Use the concepts of advanced data capturing methods necessary for engineering practice.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1		
THEORY OF ERRORS AND TRIANGULATION ADJUSTMENT Errors and classification of errors Precision and accuracy, Laws of weights and accidental errors. **PROBABILITY** Probability distribution function and density function-normal distribution. RMS error - measure of precision. Rejection of observations-principles of least squares - Normal equations.	**08 Hours**	**L1,L2**

Module -2		
METHOD OF CORRELATES Triangulation adjustment. Angle adjustment, station adjustment and figure adjustment. **HYDROGRAPHIC SURVEYING** Methods of soundings. Instruments. Three-point problem. Tidal and Stream discharge measurement	**08 Hours**	**L2,L3**
Module -3		
ELECTRONIC DISTANCE MEASUREMENT (EDM): Introduction, Electro Magnetic (EM) Waves. Phase comparison and modulations. Instruments – Geodimeter – Tellurimeter – Distomat – Range finders – Radars. Introduction to GPS Total station.	**08 Hours**	**L1,L2, L3**

Module -4		
FIELD ASTRONOMY Earth celestial sphere. Solar system Position by altitude and azimuth system-spherical triangle and spherical trigonometry. Astronomical triangle. Nepiers rule.	**04 Hours**	**L2,L3**
TIME Siderial time, day and year-solar time and day-Greenwich mean time-standard time. Meridian and azimuth-their determination-latitude and its determination.	**04 Hours**	**L2,L3**
Module -5:		
SETTING OUT WORKS Introduction. Setting out of buildings, culverts, bridge, pipeline and sewers, tunnels.	**08 Hours**	**L2,L3**

Course outcomes:

After a successful completion of the course, the student will be able to:

1. Reproduce the knowledge of geometric principles to arrive at surveying problems
2. Analyze spatial data using appropriate computational and analytical techniques with aid of electronic instruments.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum Three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- The students shall answer Five full questions selecting one full question from each module.
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Surveying Vol I, II & III- Punmia. B.C. - Lakshmi Publications, New Delhi.
2. Surveying Vol I & II- Duggal S.K. - Tata Mc Graw-Hill publishing Co.,
3. Surveying Levelling-Part I & II – Kanitkar T.P.& Kulkarni S.V. – Pune VidhyarthiGruhaPrakashana.

REFERENCE BOOKS:

1. Introduction to Surveying- James, M. Anderson and Edward, M. Mikhail – Mc Graw Hill Book Co., 1985.
2. Analysis and survey measurements- M. Mikhalil and Gracie, G. - Van Nostrand Reinhold Co., (NY)-1980.
3. Plane and Geodetic Surveying for Engineers - David Clark -Vol I & II-CBS publishers and distributors, New Delhi.

Course Title: Building Planning and Standards Professional Elective-1 [As per Choice Based Credit System (CBCS) scheme] SEMESTER – V			
Subject Code	17CT553	IA Marks	40
Number of Lecture Hours/Week	03	Exam Marks	60
Total Number of Lecture Hours	40	Exam Hours	03
CREDITS – 03		Total Marks-100	

Course objectives:

This course will enable students to:

1. Gain the knowledge of types of building and their standards for building planning and construction.
2. Understand the building components for planning and functional design of public buildings.

Modules	**Teaching Hours**	**Revised Bloom's Taxonomy (RBT) Level**
Module -1		
INTRODUCTION Terminologies, Requirement of parts of building, building component standards, Sizes of parts of building, Positioning of various components of buildings, orientation of buildings, set back distances and calculation of carpet area, plinth area and floor area ratio (simple problems).	**10 Hours**	**L1,L2,L3**
Module -2		
BASIC PARAMETERS OF PLANNING Principles of site selection, Site plan, Principles of Planning, Essential factors of planning, Consideration of Architectural design – Bye laws of locality, climate and its effects, materials and methods of construction, people and their requirements, State building Bye-Law's.	**10 Hours**	**L1,L2**

Module -3		
BUILDING TYPES AND STANDARDS Building types – Private, public, commercial, industrial, Planning criteria pertaining to various cases. Building Standards for Residential Buildings, Hospitals, Educational / Schools, Public offices, Commercial Buildings.	**10 Hours**	**L1,L2**
Module -4		
RURAL HOUSING STANDARDS Village planning, Components or rural house, Typical modern village plan, Rural house specifications – foundation and plinth, DPC, Superstructure, Doors and Windows, roofs, flooring, plastering and finishing, Bye-Laws for rural housing.	**10 Hours**	**L1,L2**
Module -5:		
Functional design of building using inter connectivity diagrams (bubble diagram), development of line diagram only for following building i) Primary health centre, ii) Primary school building, iii) College canteen iv) Office building v) Rural house (2 rooms quarter)	**10 Hours**	**L2,L3**

Course outcomes:

After a successful completion of the course, the student will be able to:

1. Select building type and their standards for planning and construction.
2. Outline the building components for planning and functional design of public buildings.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum Three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- The students shall answer Five full questions selecting one full question from each module.
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

REFERENCE BOOKS:

1. IS 1256-1967
2. National Building Code, BIS, New Delhi.
3. G.S. Birdie: “Estimating and Costing”, Dhanpat Rai Publishing Company, New Delhi.
4. Gurucharan Singh: “Building Construction”, Standard Publishers and Distributors, New Delhi.
5. Sushil Kumar “Building Construction”, Lakshmi Publishers, New Delhi.
6. Chiara and callender (Ed) – Time Saver Standards for Building Types, McGraw Hill
7. Poulhans Peters (Ed) – Design and Planning series (i) Factories (ii) New Schools (iii) Laboratories (iv) Centres for storage and distributors – Van Nostrand
8. M.F. Schmertz (Ed) – Office Building Design – II Ed., McGraw Hill.
9. Edward D. Mills – Planning Buildings for Administration, Entertainment and recreation – Newnes Butterworth.
10. Kunders – Hospital Planning, Design and Management, Book Base

Course Title: Fundamentals of Architecture

Professional Elective-1

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – V

Subject Code	17CT554	IA Marks	40
Number of Lecture Hours/Week	03	Exam Marks	60
Total Number of Lecture Hours	40	Exam Hours	03
CREDITS – 03		Total Marks-100	

Course objectives:

This course will enable students:

1. To remember the basic components for architectural design in building construction.
2. To understand the physical and aesthetic experience of buildings in order to appreciate the complexity of the influences bearing on architecture, as reflected in the major historical periods.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1		
INTRODUCTION Aim and importance of architecture; Perceptions of architecture by Architects, Definitions, Architectural composition and analysis – Terms associated with qualities, The aesthetic and functional components.	**08 Hours**	**L1,L2**
Module -2		
INFLUENCES OF THE FOLLOWING ON ARCHITECTURE Association, tradition, climate, materials, topography, religion, social customs and aspirations of the times. Various factors influencing the architecture of a region, architecture as a response to social, technological and environment forces. Evolution of shelter forms in regions of the world and examples of vernacular architecture in the world, with particular reference to India.	**08 Hours**	**L1,L2**
Module -3		
INDIAN ARCHITECTURE Historical perspective – Hindu, Jain, Buddhist, Indo-saracenic and colonial. Features, characteristics and analysis.	**08 Hours**	**L1,L2**
Module -4		

WORLD ARCHITECTURE Greek, Roman, Egyptian and Saracenic – Epochs in world architecture, Description and examples	**08 Hours**	**L1,L2**
Module -5:		
MODERN ARCHITECTURE Modern movements and modern architecture, Post-independence Architecture in India, Influences, trends and developments important Indian architects and their works, Examples of noted Indian architectural works.	**08 Hours**	**L2,L3**

Course outcomes:

After a successful completion of the course, the student will be able to:

1. Describe the basic components for architectural design in building construction.
2. Distinguish the physical and aesthetic experience of buildings in order to appreciate the complexity of the influences bearing on architecture globally.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum Three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- The students shall answer Five full questions selecting one full question from each module.
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

REFERENCE BOOKS:

1. Indian Architecture by Percy Brown, Vol. 1 &II.,Tarapore Publishers, Bombay, 1981.
2. History of Architecture by Fletcher, CBS Publishers, Delhi, 1983.

Course Title: Engineering Ethics

Open Elective 1

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – V

Subject Code	17CT561	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students:

1. To enable the students to create an awareness on Engineering Ethics and Human Values
2. To instill Moral and Social Values and Loyalty and to appreciate the rights of others.

Modules	**Teaching Hours**	**Revised Bloom's Taxonomy (RBT) Level**
Module -1:		
HUMAN VALUES Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.	**8 Hours**	**L1,L2**
Module -2:		
ENGINEERING ETHICS Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.	**8 Hours**	**L1,L2**
Module-3:		
ENGINEERING AS SOCIAL EXPERIMENTATION Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.	**8 Hours**	**L1,L2**

Module -4:		
SAFETY, RESPONSIBILITIES AND RIGHTS Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.	**8 Hours**	**L1,L2**
Module -5:		
GLOBAL ISSUES Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.	**8 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to;

1. State the ethics in society and discuss the ethical issues related to engineering.
2. Recognize the responsibilities and rights in the society related to engineering.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- ***The students shall answer Five full questions selecting one full question from each module.***
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

TEXTBOOK

1. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.

Reference Books:

1. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics –Concepts and Cases”, Thompson Wadsworth, A Division of Thomson Learning Inc.,United States, 2000
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, “Fundametals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

Course Title: SPECIAL CONCRETE

Open Elective 1

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – V

Subject Code	17CT562	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students:

1. To gain the fundamental knowledge of various special concrete over conventional concrete.
2. To comprehend the various properties of special concrete and conventional concrete.
3. To apply the codal procedural knowledge for calculation of mix proportions for various special concrete.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
INTRODUCTION Fundamentals of concrete technology in relation to special concrete requirements, types of special concretes and their applications. **FIBER REINFORCED CONCRETE** Fiber material, mix proportions, fiber content – distribution, orientation and interfacial bond. Fiber concrete properties in fresh state. Strengthen behavior in tension, compression and bending. Toughness and related tests, Mix design criteria and application.	**8 Hours**	**L2,L3**
Module -2:		
HIGH DENSITY CONCRETE Materials, placement method, properties in wet and hardened state, Mix design criteria and applications **SELF COMPACTING CONCRETE** Introduction, Properties, Test methods and its application.	**8 Hours**	**L2,L3**

Module-3:		
LIGHTWEIGHT CONCRETE Classification, Properties of lightweight concrete, Strength and durability, Design of lightweight concrete mixes. **POLYMER CONCRETE** Materials, Types, Properties, Mix design criteria and its applications	**8 Hours**	**L2,L3**
Module -4:		
HIGH STRENGTH CONCRETE General introduction, significance of HSC, methods of making HSC, materials and mix proportions. Application of HSC, Ultra HSC, Methods of making Ultra HSC.	**8 Hours**	**L2,L3**
Module -5:		
HIGH PERFORMANCE CONCRETE General introduction and significance of HPC. Mix design criteria using plasticizes, SP, HP, Pozzolanic materials such as fly ash, ground granulated blast furnace slag, silica fumes, Metakaolin rice husk ash.	**8 Hours**	**L2,L3**

Course outcomes:

After studying this course, students will;

1. Acquire the knowledge of various special concrete over conventional concrete.
2. Compare the various properties of special concrete with conventional concrete.
3. Design the mix proportions for special concrete as per relevant codal standards.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- ***The students shall answer Five full questions selecting one full question from each module.***
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Reference Books:

1. Concrete Microstructures, Properties and Materials by P.K. Mehta, and Paulo J.M., Monteiro, Indian Edition.
2. Properties of Concrete by A.M. Neville, Longmans, 4th Edition, 1995
3. Relevant National, International Codes, Technical Papers and Internet Information for Special Concrete.

Course Title: Remote Sensing and GIS

Open Elective 1

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – V

Subject Code	17CT563	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students;

1. Understand the basic concepts of remote sensing.
2. Analyze satellite imagery and extract the required units.
3. Extract the GIS data and prepare the thematic maps.
4. Use the thematic maps for various applications.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Remote Sensing:-Basic concept of Remote sensing, Data and Information, Remote sensing data collection, Remote sensing advantages & Limitations, Remote Sensing process. Electromagnetic Spectrum, Energy interactions with atmosphere and with earth surface features(soil, water, vegetation),Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.	**8 Hours**	**L1,L2,L3**
Module -2:		
Remote Sensing Platforms, Sensors and Properties of Digital Data, Data Formats: Introduction, platforms- IRS, Landsat, SPOT, Cartosat, Ikonos, Envisatetc. Sensors-active and passive, MSS, AVHRR, LISS, TM, PAN, WIFS, microwave sensors, sensor resolutions (spatial, spectral, radiometric and temporal). Basics of digital image processing- radiometric and geometric corrections. Image enhancements, image transforms based on arithmetic operations, image filtering.	**8 Hours**	**L2, L3,L4**

Module-3:		
Geographic Information System: Introduction to GIS; components of a GIS ; Geo spatial Data: Spatial Data- Attribute data-Joining Spatial and attribute data; GIS Operations: Spatial Data Input – Attribute data Management -Data display Data Exploration – Data Analysis. Coordinate Systems: Geographic coordinate System: approximation of the Earth, Datum; Map Projections: Types of Map Projections – Map projection parameters – Commonly used Map Projections- Projected coordinate Systems.	**8 Hours**	**L2, L3,L4**
Module -4:		
Vector and Raster Data Model: Vector data model: Representation of simple features – Topology and its importance; coverage and its data structure, Shape file; Data models for composite feature Objects based Vector Data Model. Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data conversion, Integration of Raster and Vector data.	**8 Hours**	**L3,L4,L5**
Module -5:		
Integrated Applications of Remote sensing and GIS: Applications in land use, land cover analysis, change detection, water resources, urban planning, environmental planning, Natural resource management and Traffic management.	**8 Hours**	**L3,L4,L5**

Course outcomes:

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

1. Collect data and delineate various elements from the satellite imagery using their spectral signature.
2. Analyze different features of ground information to create raster or vector data.
3. Perform digital classification and create different thematic maps for solving specific problems
4. Make decision based on the GIS analysis on thematic maps

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- ***The students shall answer Five full questions selecting one full question from each module.***
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Narayan Panigrahi, **"Geographical Information Science"**, ISBN 10: 8173716285 / ISBN 13: 9788173716287, University Press 2008.
2. Basudeb Bhatta, **"Remote sensing and GIS"**, ISBN:9780198072393, Oxford University Press 2011
3. Kang – Tsurg Chang, **"Introduction to Geographic Information System".** Tata McGraw Hill Eduction Private Limited 2015.
4. Lillesand, Kiefer, Chipman, "**Remote Sensing and Image Interpretation**", Wiley 2011.

Reference Books:

1. Chor Pang Lo and Albert K.W Yeung, "Concepts & Techniques of GIS", PHI, 2006
2. John R. Jensen, "Remote sensing of the environment", An earth resources perspective – 2nd edition – by Pearson Education 2007.
3. Anji Reddy M., "Remote sensing and Geograperhical information system", B.S. Publications 2008.
4. Peter A. Burrough, Rachael A. McDonnell, and Christopher D. Lloyd, "Principals of Geo physical Information system", Oxford Publications 2004.

Course Title: CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT

Open Elective 1

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – V

Subject Code	17CT564	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students;

1. Identify the factors influencing the global climate systems and clean technologies for sustainable development
2. Assess the impacts of climate change on global, regional and local scales.
3. Develop strategies for adaptation and mitigation measures.

Modules	**Teaching Hours**	**Revised Bloom's Taxonomy (RBT) Level**
Module -1:		
EARTH'S CLIMATE SYSTEM Introduction-Climate in the spotlight - The Earth's Climate Machine – Climate Classification - Global Wind Systems – Trade Winds and the Hadley Cell – The Westerlies - Cloud Formation and Monsoon Rains – Storms and Hurricanes – The Hydrological Cycle – Global Ocean Circulation – El Nino and its Effect - Solar Radiation - The Earth's Natural Green House Effect – Green House Gases and Global Warming – Carbon Cycle.	**9 Hours**	**L1,L2**
Module -2:		
CLIMATE CHANGES AND ITS CAUSES Observation of Climate Change – Changes in patterns of temperature, precipitation and sea level rise – Observed effects of Climate Changes – Patterns of Large Scale Variability – Drivers of Climate Change – Climate Sensitivity and Feedbacks – The Montreal Protocol – UNFCCC – IPCC – Evidences of Changes in Climate and Environment – on a Global Scale and in India – climate change modelling.	**8 Hours**	**L1,L2**

Module-3:		
IMPACTS OF CLIMATE CHANGE Impacts of Climate Change on various sectors – Agriculture, Forestry and Ecosystem – Water Resources – Human Health – Industry, Settlement and Society – Methods and Scenarios – Projected Impacts for Different Regions– Uncertainties in the Projected Impacts of Climate Change – Risk of Irreversible Changes.	**7 Hours**	**L1,L2**
Module -4:		
CLIMATE CHANGE ADAPTATION AND MITIGATION MEASURES Adaptation Strategy/Options in various sectors – Water – Agriculture –- Infrastructure and Settlement including coastal zones – Human Health – Tourism – Transport – Energy – Key Mitigation Technologies and Practices – Energy Supply – Transport – Buildings – Industry – Agriculture – Forestry - Carbon sequestration – Carbon capture and storage (CCS)- Waste (MSW & Bio waste, Biomedical, Industrial waste – International and Regional cooperation.	**9 Hours**	**L2,L3**
Module -5:		
CLEAN TECHNOLOGY AND ENERGY Clean Development Mechanism –Carbon Trading- examples of future Clean Technology – Biodiesel – Natural Compost – Eco-Friendly Plastic – Alternate Energy – Hydrogen – Bio-fuels – Solar Energy – Wind – Hydropower – Mitigation Efforts in India and Adaptation funding.	**7 Hours**	**L2,L3**

Course outcomes:

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

1. Identify the factors influencing the global climate systems and clean technologies for sustainable development
2. Assess the impacts of climate change on global, regional and local scales.
3. Develop strategies for adaptation and mitigation measures.

Program Objectives (as per NBA)

- Engineering Knowledge.
- Problem Analysis.

Question paper pattern:

- The question paper will have Ten questions, each full question carrying 16 marks.
- There will be two full questions (with a maximum three sub divisions, if necessary) from each module.
- Each full question shall cover the topics under a module.
- ***The students shall answer Five full questions selecting one full question from each module.***
- If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Reference Books:

1. Anil Markandya, Climate Change and Sustainable Development: Prospects for Developing Countries, Routledge, 2002

2. Heal, G. M., Interpreting Sustainability, in Sustainability: Dynamics and Uncertainty, Kluwer Academic Publ., 1998

3. Jepma, C.J., and Munasinghe, M., Climate Change Policy – Facts, Issues and Analysis, Cambridge University Press, 1998

4. Munasinghe, M., Sustainable Energy Development: Issues and Policy in Energy, Environment and Economy: Asian Perspective, Kleindorfor P. R. et. al (ed.), Edward Elgar, 1996

5. Dash Sushil Kumar, "Climate Change – An Indian Perspective", Cambridge University Press India Pvt. Ltd, 2007

Course Title: Computer Aided Building Drawing

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – V

Subject Code	17CTL57	I.A. Marks	40
Number of Lecture Hours/Week	03 (1hr Instructions + 2hr Drawing)	Exam. Marks	60
Total Number of Lecture Hours	42	Exam. Hours	03
CREDITS – 02		Total Marks-100	

Course objectives: This course will enable students;

1. Understand the details of construction of different building elements.
2. Visualize the completed form of the building and the intricacies of construction based on the engineering drawings in software.

Modules	**Teaching Hours**	**Revised Bloom's Taxonomy (RBT) Level**
Module -1:		
Basics of AUTOCAD: *Drawing tools:*Lines, Circle, Arc, Polyline, Multiline, Polygon, Rectangle, Spline, Ellipse *Modifying tools*: Erase, Copy, Mirror, Offset, Array, Move, Rotate, Scale, Stretch, Lengthen, Trim, Extend, Break, Chamfer and Fillet *Using Text*: Single line text, Multiline text, Spelling, Edit text, *Special Features*: View tools, Layers concept, Dimension tools, Hatching, Customizing toolbars, Working with multiple drawings	**06 Hours**	**L1,L2**
Module -2:		
Use of AUTOCAD in Civil Engineering Drawings: Drawings Related To Different Building Elements: i) Cross section of Foundation - masonry wall, Isolated RCC columns ii) Different types of staircases(Dog-legged and open well) iii) RCC - Lintel and Chejja iv) Doors – Two Panelled, Glazed and Partially Glazed. v) RCC slabs (Simply supported-discontinuous- One-Way & Two Way slab) and beams.	**24 Hours**	**L2,L3**

Module -3:		
Building Drawings: Drawing of Plan, elevation and sectional elevation of single storied and two storied residential building given the single line diagram	**12 Hours**	**L2,L3**

Course outcomes:

After a successful completion of the course, the student will be able to:

1. Prepare, read and interpret the drawings in a professional set up.
2. Plan and design a residential or public building as per the given requirements with software aid.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*

Question paper pattern:

· There will be two full questions with sub divisions if necessary from Module 2 with each full question carrying **thirty** marks. Students have to answer one question.

· There will be one compulsory full question from Module 3 carrying **fifty** marks.

REFERENCE BOOKS:

1. Computer Aided Design Laborator- DrM.N.Shesha Prakash, Dr.G.S.Suresh, Lakshmi Publications

2. CAD Laboratory- M.A.Jayaram, D.S.Rajendra Prasad- Sapna Publications

Course Title: Geotechnical Engineering Laboratory

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – V

Subject Code	17CTL58	I.A. Marks	40
Number of Lecture Hours/Week	03 (1hr tutorial + 2hr laboratory)	Exam. Marks	60
Total Number of Lecture Hours	42	Exam. Hours	03
CREDITS – 02		Total Marks-100	

Course Objectives: Provide students with a basic understanding;

1. To carry out laboratory tests and to classify soil as per IS codal procedures.
2. To conduct experiments to determine hydraulic conductivity and degree of compaction of soil.
3. To perform tests to determine shear strength and consolidation characteristics of soils.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Exercise -1:		
Tests for determination of specific gravity and moisture content	**3**	**L2,L3,L4**
Exercise -2:		
Grain Size analysis of soil samples (Sieve analysis)	**3**	**L2,L3,L4**
Exercise -3:		
In situ density by core cutter and sand replacement methods	**3**	**L2,L3,L4**
Exercise -4:		
Consistency limits – Liquid limit (Casagrande and cone penetration methods), plastic limit and shrinkage limit	**6**	**L2,L3,L4**
Exercise -5:		
Standard proctor compaction test and modified proctor compaction test	**6**	**L2,L3,L4**
Exercise -6:		
Coefficient of permeability by constant head and variable head methods	**3**	**L2,L3,L4**
Exercise -7:		
Strength tests 7.1 Unconfined compression test 7.2 Direct shear test 7.3 Triaxial compression test (Undrained)	**9**	**L2,L3,L4**
Exercise -8:		
Consolidation test – Determination of compression index and coefficient of consolidation	**3**	**L2,L3,L4**

Exercise -9:		
Demonstration of 9.1 Miscellaneous equipment's such as augers, samplers, rapid moisture meter, Proctor's needle 9.2 Free swell index test 9.3 Determination of relative density of sand 9.4 Plate Load Test 9.5 Standard Penetration Test 9.6 Cone (Dynamic & static) Penetration Test 9.7 Seismic Refraction Method 9.8 Rock Quality Designation	**6**	**L1,L2**

Course outcomes:

After a successful completion of the course, the student will be able to:

1. Reproduce procedural knowledge of laboratory tests and to identify soil as per IS codal procedures.
2. Determine index properties of soil as per IS codal procedures

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*

Question paper pattern:

- All experiments are to be included in the examination except demonstration exercises.
- Candidate to perform experiment assigned to him
- Marks are to be allotted as per the split up of marks shown on the cover page of answer script

Reference Books:

1. Punmia B C, Soil Mechanics and Foundation Engineering- (2017), 16th Edition, Laxmi Publications co., New Delhi.
2. Lambe T W “Soil Testing for Engineers”, Wiley Eastern Ltd, New Delhi.
3. Head K H (1986) “Manual of soil laboratory testing”, Vol I, II and III, Pentech Press, London.
4. Bowles J E (1988) “Engineering Properties of soils and their measurements”, McGraw Hill Book Co, New York
5. Relevant BIS Codes of Practice: 2720(Part-3/Sec. 1) – 1987; IS 2720 (Part – 2)- 1973; IS 2720 (Part – 4) –1985; IS 2720 (Part – 5) – 1985; IS 2720 (Part – 6) – 1972; IS 2720 (Part – 7) – 1980; IS 2720 (Part – 8) –1983; IS 2720 (Part – 17) – 1986; IS 2720 (Part - 10) – 1973; IS 2720 (Part – 13) – 1986; IS2720 (Part 11) –1971; IS2720 (Part 15) – 1986; IS 2720 (Part 30) – 1987; IS 2720 (Part 14) – 1977; IS 2720 (Part – 14) – 1983;IS 2720 (Part – 28) – 1974; IS 2720 (Part – 29) – 1966, IS 2720 (Part-60) 1965.

Course Title: Construction Quality Management

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VI

Subject Code	17CT61	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03
CREDITS – 04		Total Marks-100	

Course objectives: This course will enable students;

1. To facilitate the understanding of Quality Management principles and process.
2. To remember quality control processes for different works in construction industry.
3. To apply the knowledge of Total Quality Management for quality certification of construction projects.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
QUALITY: Principles, Concepts in Quality Management, Managing for quality, Impact of Quality Management in Business and Commerce. Quality Control, Quality costs and its components, Features of Quality, Determinants of service Quality, Need for Quality management in industry.	**10 Hours**	**L1,L2**
Module -2:		
TOTAL QUALITY MANAGEMENT: Meaning and Scope, TQM models – Oakland Model, integrated model of TQM, Building blocks of TQM, 3-D Model of TQM, Benefits of TQM program, causes for TQM failures, Remedial measures, Quality Manuals, System Procedures. ISO: 9001:2000 - Process Approach, Compatibility with other management systems, certification Procedure, ISO: 9000 for construction, ISO 14000: Environmental Management – general requirements, Environmental Policy, Planning, Implementation and operation, Checking and Corrective action.	**10 Hours**	**L1,L2,L4**

Module-3:		
QUALITY CIRCLE: Objectives, structure, steps in formation of Quality Circle, Roles and Responsibilities of QC members and Facilitator, Skills for the Facilitator, precautions to be taken by the Facilitator. Roles and Responsibilities of Leader/ Deputy leader, Prerequisites for a successful leader, Roles and Responsibilities of Steering Committee, Procedure to conduct QC meetings, Quality Audit.	**10 Hours**	**L2,L4**
Module -4:		
QUALITY CONTROL IN CONSTRUCTION PROJECTS QC in concreting, Brick work, stone masonry, Formwork, Foundations, Piling work, Structural work, Woodwork & Timber, Painting, Electrical system, Waste recovery and maintenance.	**10 Hours**	**L2,L4**
Module -5:		
QUALITY MANAGEMENT SYSTEM IN CONSTRUCTION PROJECTS: Concept, Approach to Problems, Quality Assurance, Quality Control, Quality Inspection, Records and Reports, Training, Total Quality Control, Manual/Check Lists, Guide Lines. **BENCH MARKING:** Sources, Process & Step model for Benchmarking, Types of Benchmarking and Code of Conduct. Internal & External Benchmarking, Advantages of Benchmarking.	**10 Hours**	**L1,L2,L4**

Course outcomes:

After studying this course, students will be able to;

1. Describe the quality management principles & process related to construction projects
2. Select the quality control processes required for different works in construction industry.
3. Demonstrate the knowledge of Total Quality Management for quality certification of construction projects

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Total Quality Management for Engineers by Mohammed Zairi, Aditya Books Pvt. Ltd., New Delhi. 1992.
2. Project Planning and Control with PERT and CPM by B.C. Punmia and K.K. Khandelwal, Lakshmi Publications Pvt. Ltd., New Delhi.
3. Total Quality Management by B. Janakiraman and R.K. Goapal, Prentice-Hall of India Private Limited, New Delhi.

Reference Books:

1. Quality in the Construction Project by Fox, Arthur J., and Holly A. Cornell, American Society of Civil Engineers, New York, Latest Edition.
2. Total Quality Management by Mohantry R.P. and Lakhe R.R., Jaico Publishing House, Mumbai, 2000.
3. Total Quality Management by Break Joseph and Susan Joseph, Excel Books, New Delhi, 1995.
4. Total Quality in Construction Projects by Hellard R.B.: Achieving profitability with customer satisfaction, Thomas Telford, London, 1993.
5. Quality Management by Manjual, Satish, Raj Publishing House, Jaipur, 1999.

Course Title: Building Services-I

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VI

Subject Code	17CT62	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03
CREDITS – 04		Total Marks-100	

Course objectives: This course will enable students;

1. To gain the knowledge of different building services and their types used in buildings.
2. To comprehend requirements and constraints in providing building services suitable for buildings.
3. To determine design factors of building services suitable for buildings.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Introduction: requirements and necessity of services for buildings. Types of Building services. Water supply in buildings- systems of water supply, types of distribution system, appurtenances, Fire water supply system.	**10 Hours**	**L1,L2,**
Module -2:		
Drainage system of buildings- systems of drainage, methods of carrying refuse from buildings, House Drainage- General Principles, Traps- Classification of Traps and Sanitary Fittings Air conditioning of buildings- essentials of air-conditioning systems, classification based on function & season, systems, design- AC load calculations, installation and maintenance cost.	**10 Hours**	**L2,L3,L4**

Module-3:		
Acoustics - Definition of terminologies - Behaviour of Sound in enclosures - Acoustic materials-properties, Acoustical Defects & Remedies - design of assembly halls, theatre, auditorium and musical studio Noise control in buildings: Sound insulation-Materials, Types- Horizontal Barriers & Vertical Barriers	**10 Hours**	**L2,L4**
Module -4:		
Fire protection: necessity, fire hazards, characteristics and types of fire resistant materials, fire load and its calculation, fire resistant construction – walls and columns, floors and roofs, wall openings, escape elements and strong room construction, fire protection equipment. General fire safety requirements.	**10 Hours**	**L1,L2,L4**
Module -5:		
Electrical wiring- - Planning of Electrical Supply System - Systems of wiring- domestic and commercial buildings - Materials and Devices used in Wiring - Earthing- Procedure and Types - Inspection and Testing of Installation - Electrical Supply layout and conventional symbols of electrical items	**10 Hours**	**L1, L2,L4**

Course outcomes:

After studying this course, students will be able to;

1. Outline different building services and their types used in buildings.
2. Describe requirements and constraints in providing building services
3. Interpret the knowledge of design factors of services in building construction.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Water supply and sanitary engineering by Rangwala,
2. Acoustics and noise control-theory, design by S.K.Kandaswamy(Ed),practice-allied publishers
3. Mechanical and electrical systems by Mc Gainess and stein, John Wiley and Sons.1977.

Reference Books:

1. ISSP35: Hand Book on water supply and drainage.
2. Architectural acoustic design guide by Acenteen and Cowan, Book Base Member.

Course Title: Fluid Mechanics and Hydraulic Machines

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VI

Subject Code	17CT63	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03
CREDITS – 04		Total Marks-100	

Course Objectives: The objectives of this course is to make students to learn:

1. Basic concepts of fluid, Energy concepts of fluid in open channel, Energy dissipation, Water surface profiles at different conditions.
2. The working principles of the hydraulic machines for the given data and analyzing the performance of turbines for various design data.
3. Design the open channels of various cross sections including design of economical sections.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
BASIC PROPERTIES OF FLUIDS: Introduction, Definition of Fluid, Systems of units and properties of fluid: Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Cohesion, Adhesion, Surface tension, & Capillarity. Newton's law of viscosity (theory & problems). Capillary rise in a vertical tube and between two plane surfaces (theory & problems). **PRESSURE AND ITS MEASUREMENT:** Definition of pressure, Pressure at a point, Pascal's law, Variation of pressure with depth. Types of pressure. Vapor pressure. Measurement of pressure using a simple, differential & inclined manometer (theory & problems). Introduction to Mechanical and electronic pressure measuring devices.	**10 Hours**	**L1,L2,L3**
Module -2:		
Basic definitions of hydrostatic pressure, equations for hydrostatic force and depth of centre of pressure for Vertical and inclined submerged laminae (plane and curved)- Problems. **DYNAMICS OF FLUID FLOW:** Introduction, Energy possessed by a fluid body. Euler's equation of motion along a streamline and Bernoulli's equation. Assumptions and limitations of Bernoulli's equation. Problems on applications of Bernoulli's equation (with and without losses). Introduction to kinetic energy correction factor.	**10 Hours**	**L2,L3,L4**

Momentum equation problems on pipe bends.		
Module-3:		
Introduction, losses in pipe flow, Darcy-Weisbach equation for head loss due to friction in a pipe. Pipes in series, pipes in parallel, equivalent pipe – problems. **DISCHARGE MEASUREMENTS:** Introduction, Venturimeter, Orifice meter, Triangular notch, Rectangular notch, Cipolletti notch.	**10 Hours**	**L2,L3,L4**
Module -4:		
IMPACT OF JET ON VANES: Introduction to Impulse – momentum equation and its applications, Force exerted by a jet on a fixed target, Derivations, Force exerted by a Jet on a moving target, Derivations, Force exerted by a jet on a series of curved vanes, Concept of velocity triangles, Equation for work done & efficiency, Problems of force exerted by a Jet on a series of curved vanes. **FLOW IN OPEN CHANNELS:** Definition of open channels, Classification, Difference between pipe flow & open channel flow, Types of flow, Geometric properties of open channels, Uniform flow in open channels, Chezy's and Manning's formulae, Problems on uniform flow, Most economical open channels. Derivation of conditions for rectangle, triangle and trapezoidal sections, Problems on most economical sections, Most economical circular channels derivations and problems.	**10 Hours**	**L2,L3,L4**
Module -5:		
HYDRAULIC TURBINES: Introduction, Types and classifications, Pelton Wheel, theory, equation for work done and efficiency, design parameters, Problems on Pelton Wheel, Francis Turbine – Theory, equation for work done and efficiency, design parameters, Problems on Francis turbine. **CENTRIFUGAL PUMPS:** Definition of pump, classification, Description & general principle of working, priming & methods, Work done & efficiencies of a centrifugal pump, Minimum starting speed, cavitation in centrifugal pumps, Multistage pumps, Problems on Centrifugal pumps.	**10 Hours**	**L2,L3,L4**
Course outcomes: After studying this course, students will be able to; 1. Describe the concepts of fluid, Energy concepts of fluid in open channel, Energy dissipation, Water surface profiles at different conditions. 2. Select suitable type of hydraulic machines for the given data and determine the		

performance of turbines for various design data.

3. Construct open channels of various cross sections including design of economical sections.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Hydraulics & Fluid Mechanics, Modi & Seth., Standard Book House, New Delhi.
2. Fluid Mechanics & Machinery, Raghunath. H M., CBS Publishers.
3. Text Book on Fluid mechanics & Hydraulic Machines, Bansal R.K., Laxmi pulications

Reference Books:

1. Fluid Mechanics and Hydraulic Machines, S.C. Gupta, Pearson Education, India

2. Elementary Hydraulics' (1st Edition) James F Cruise, Vijay P. Singh, Mohsan M. Sherif, Thomson Learning.

3. Hydraulics & Fluid Mechanics, K.R. Arora, Standard Book house, New Delhi.

Course Title: Construction Planning and Control

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VI

Subject Code	17CT64	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03
CREDITS – 04		Total Marks-100	

Course objectives: This course will enable students;

1. To study and understand construction planning and scheduling for successful completion of projects.
2. To comprehend the concepts of construction planning for proper organizational management of construction projects.
3. To apply the procedural knowledge of planning and scheduling for execution and cost control of inventory in construction.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Constructing Planning: Introduction: Phase of project, project management and its relevance, stakeholders of a project, structure of project organization, management levels, and traits of a project manager. Basic concepts in the Development of Construction Plans, Planning Process – Choice of Technology and Construction Method – Defining Work Tasks – Defining Precedence Relationships Among Activities – Estimating Activity Durations – Estimating Resource Requirements for Work Activities – Coding Systems.	**10 Hours**	**L1,L2**
Module -2:		
Scheduling Procedures and Techniques Project Organization, Bar Charts, Work Breakdown Structure, Time estimates, Applications of CPM and PERT- Scheduling, Monitoring and Updating. Line of Balance Scheduling.	**10 Hours**	**L2,L3,L4**

Module-3:		
Crashing and Time/Cost Tradeoffs – Scheduling in Poorly Structured Problems – Improving and Scheduling Process, work breakdown structure. Project scheduling and resource leveling: Introduction, Resource allocation and leveling for unlimited resources, Resource allocation for limited resources, Multi resource allocation, Optimal scheduling.	**10 Hours**	**L2,L3,L4**
Module -4:		
Cost Control, Monitoring and Accounting The Cost Control Problem – The Project Budget – Forecasting for Activity Cost Control – Financial Accounting Systems and Cost Accounts – Control of Project Cash Flows – Schedule Control – Schedule and Budget Updates – Relating Cost and Schedule Information.	**10 Hours**	**L2,L3,L4**
Module -5:		
Organization and Use of Project Information: Types of Project Information – Accuracy and Use of Information – Computerized Organization and Use of Information – Organizing Information in Databases – Relational Model of Databases – Other Conceptual Models of Databases – Centralized Database Management Systems – Databases and Applications Programs – Information Transfer and Flow.	**10 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to;

1. Recall the concepts in construction planning and scheduling for successful completion of projects.
2. Review the elements in construction planning for proper organizational management of construction projects.
3. Prepare planning and scheduling structure for execution and cost control of inventory in construction.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Project Management by Ahuja H.N., John Wiley, New York, 1999.
2. Construction Project Management – Planning, Scheduling and Controlling by Chitkara K.K., Tata McGraw Hill, New Delhi, 2000.

Reference Books:

1. Critical Path Methods in Construction Practice by Antil J.M. and Woodhead R.W., John Wiley, Canada,1999.
2. Project Management in Construction by Levy Sidney, McGraw Hill Professional, New York, 2000.
3. CPM in Construction Management by O'brien James, McGraw Hill, New York, 1999.

Course Title: Infrastructure Valuation

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VI

Subject Code	17CT651	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students;

1. Understand the importance of Infrastructure valuation in construction.
2. Determine special techniques in Infrastructure valuation.
3. Apply structured phases of value engineering as analytical and decision-making skills in the valuation job.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Valuation- Definitions of various terms, Purpose of valuation, types of property- Depreciation, sinking fund, Lease hold and free hold property, obsolescence, Gross income, Outgoing and Net income, Capitalized value and year's purchase (Simple Problems).	**08 Hours**	**L1,L2,L3**
Module -2:		
Rental Method, Profit based method, cost based method, development based method, depreciation method and value, plinth area method, capital value comparison method. Numerical problems on above.	**08 Hours**	**L2,L4**
Module-3:		
General Techniques in Infrastructure Valuation: The Gordon Technique, Feasibility Ranking, the Morphological Analysis Technique, ABC Analysis, EOQ Analysis, Make or Buy Technique, Case Study Discussions.	**08 Hours**	**L2,L3,L4**
Module -4:		
Special Techniques in Infrastructure Valuation: Function – Cost – Worth Analysis, Function Analysis System Technique - Technically oriented FAST and Customer-oriented FAST, Weighted Evaluation	**08 Hours**	**L2,L3,L4**

Method - Equal Importance Method.		
Module -5:		
Applications of Infrastructure Valuation: Value Engineering: Introduction, History of value engineering, Value, Function, Cost, Worth, Case Study Discussions., Definition of the creative and structured phases of value engineering, The workshop approach to achieving value, Target setting, Time management, Case Study Discussions.	**08 Hours**	**L2,L3**

Course outcomes:

After studying this course, students will be able to;

1. Describe the significance of Infrastructure valuation in construction.
2. Demonstrate special techniques in Infrastructure valuation.
3. Illustrate structured phases of value engineering as analytical and decision-making skills in the valuation job.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Estimating & Costing, B. N. Dutta, Chand Publisher
2. Text book of Estimating & Costing- G.S. Birde, Dhanpath Rai and sons : New Delhi.

Reference Books:

1. Anil Kumar Mukhopadhyaya, Value Engineering Concepts, Techniques and Applications,Response Books, 2013.
2. Anil Kumar Mukhopadhyaya, Value Engineering Mastermind from Concept to Value Engineering Certification, Response Books, 2009.
3. Banerjee D.N (1998) " Principles and Practice of Valuation ". Eastern law house
4. Roshan H. Namavathi,(2001) "Professional Practice " Lakhani Book Depot.
5. Mitra A.K., (1986)"Theory and Practice of Valuation " Eastern law house Rao Gopinath C H,(2002) “Valuation Practices of Immovable Properties.” Edition 12, Publisher, C H Gopinath Rao, Chennai.

Course Title: Ground Improvement Techniques

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VI

Subject Code	17CT652	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students;

1. Remember the fundamental concepts of ground improvement techniques
2. Understand the concepts of chemical compaction, grouting, geo synthetics, vibration, grouting and other miscellaneous methods.
3. Apply factual knowledge to solve problems in the field for modification of ground required for construction of civil engineering structures.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
GROUND IMPROVEMENT: Definition, Objectives of ground improvement, Classification of ground improvement techniques, Factors to be considered in the selection of the best soil improvement technique. Ground modification for Black Cotton soil.	**08 Hours**	**L1,L2**
Module -2:		
COMPACTION: Effect of grain size distribution on compaction for various soil types like lateritic soil, coarse-grained soil and micaceous soil. Effect of compaction on engineering behavior like compressibility, swelling and shrinkage, permeability, relative density, liquefaction potential. Field compaction – static, dynamic, impact and vibratory type. Specification of compaction. Tolerance of compaction. Shallow and deep compaction, Dynamic Compaction, Vibrofloatation.	**08 Hours**	**L1,L2,L4**

Module-3:		
HYDRAULIC MODIFICATION: Definition, Principle and techniques. gravity drain, lowering of water table, multistage well point, vacuum dewatering. Discharge equations. Design of dewatering system including pipe line effects of dewatering **DRAINAGE & PRELOADING:** Importance, Vertical drains, Sand drains, Drainage of slopes, Electro kinetic dewatering, Preloading.	**08 Hours**	**L1,L2,L4**
Module -4:		
CHEMICAL MODIFICATION-I: Definition, cement stabilization, sandwich technique, admixtures. Hydration – effect of cement stabilization on permeability, Swelling and shrinkage and strength and deformation characteristics. Criteria for cement stabilization. Stabilization using Fly ash. **CHEMICAL MODIFICATION-II:** Lime stabilization – suitability, process, criteria for lime stabilization. Other chemicals like chlorides, hydroxides, lignin and hydrofluoric acid. Properties of chemical components, reactions and effects. Bitumen, tar or asphalt in stabilization.	**08 Hours**	**L1,L2**
Module -5:		
GROUTING: Introduction, Effect of grouting. Chemicals and materials used. Types of grouting. Grouting procedure, Applications of grouting. **MISCELLANEOUS METHODS (ONLY CONCEPTS & USES):** Soil reinforcement, Thermal methods, Ground improvement by confinement – Crib walls, Gabions and Mattresses, Anchors, Rock bolts and soil nailing. Stone Column, Micro piles.	**08 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to;

1. Define the fundamental concepts of ground improvement techniques.
2. Select suitable technique such as chemical compaction, grouting, geo synthetics, vibration, grouting and other miscellaneous methods for improving ground conditions.
3. Solve problems in the actual field conditions for modification of ground required for construction of civil engineering structures

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Ground Improvement Techniques- Purushothama Raj P. (1999) Laxmi Publications, New Delhi.
2. Construction and Geotechnical Method in Foundation Engineering- Koerner R.M. (1985) - Mc Graw Hill Pub. Co., New York.

Reference Books:

1. Engineering principles of ground modification- Manfred Hausmann (1990) - Mc Graw Hill Pub. Co., New York.
2. Methods of treatment of unstable ground- Bell, F.G. (1975) Butterworths, London.
3. Expansive soils- Nelson J.D. and Miller D.J. (1992) -, John Wiley and Sons.
4. Soil Stabilization; Principles and Practice- Ingles. C.G. and Metcalf J.B. (1972) - Butterworths, London.

Course Title: Water Supply and Sanitation

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VI

Subject Code	17CT653	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students;

1. Evaluate the sources and conveyance systems for raw and treated water.
2. Study drinking water quality standards and to illustrate qualitative analysis of water.
3. Analyze the variation of water demand and to estimate water requirement for a community.
4. Design physical, chemical and biological treatment methods to ensure effective treatment of sewage

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Introduction: Requirement of water for various beneficial uses, need for protected water supply. **Demand of Water:** Types of water demands - domestic demand in detail, institutional and commercial, public uses, fire demand. Per-capita consumption - factors affecting per-capita demand, population forecasting, different methods with merits and demerits - variations in demand of water. Fire demand. Design periods and factors governing the design period. **Quality of Water:** Objectives of water quality management. Concept of safe water wholesomeness, palatability and potable, waterborne diseases. Examination of water: - Objectives – Physical, Chemical and Microbiological Examinations, (IS:3025and IS:1622).	**08Hours**	**L1,L2**
Module -2:		
Drinking water standards- BIS & WHO standards, Health significance of Fluoride, Nitrates. **Water Treatment:** Objectives - Treatment flowchart. Aeration - Principles, types of aerators. **Sedimentation**: Theory, settling tanks, types and design. Aided s **Filtration**: Mechanism - theory of filtration, types of filters, slow	**08 Hours**	**L2,L4**

sand, rapid sand and pressure filters including construction, operation, cleaning.		
Module-3:		
Disinfection: Theory of disinfection, methods of disinfection, Chlorination, chlorine demand, residual chlorine. **Softening**: Definition, methods of removal of hardness by lime soda-process and zeolite process. Removal of color, odour, taste with methods like aeration, use of copper sulfate, activated carbon treatment, oxidizing organic matters, removal of iron and manganese, fluoridation and de-fluoridation. **Methods of Distribution Systems**: System of supply, service reservoirs and their capacity determination, methods of layout of distribution systems. - **Miscellaneous:** pipe fittings, location of water supply pipes in buildings	**08 Hours**	**L1,L2**
Module -4:		
Waste water disposal - Necessity for sanitation, methods of sewage disposal, types of sewerage systems and their suitability. **Quantity of Sewage:** Dry weather flow, factors affecting dry weather flow, flow variations and their effects on design of sewerage system, Estimation of storm flow, Rational method and Empirical formulae of design of storm water drain, Time of concentration. **Sewer Appurtenances:** Catch basins, Manholes, Flushing tanks, oil and grease traps, Drainage traps, Basic principles of house drainage, Typical layout plan showing house drainage connections, maintenance of house drainage. Sewage Pumps - Need, Types of pumps and pumping stations. Analysis of Sewage: Physical, chemical and Biological characteristics, concepts of Aerobic and Anaerobic activity, more emphasis on BOD and COD	**08 Hours**	**L1,L2**
Module -5:		

Treatment of Sewage: Flow diagram of municipal sewage treatment plant Primary treatment: screening, grit chambers, skimming tanks and design of primary sedimentation tanks. Secondary treatment: Trickling filter (introduction only)Activated sludge process - Principle and flow diagram, methods of aeration, modifications. Methods of sludge disposal: Sludge digestion and Sludge drying beds.	**08 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to;

1. Evaluate available sources of water, quantitatively and qualitatively and make appropriate choice for a community.
2. Determine water quality and environmental significance of various parameters and plan suitable treatment system.
3. Estimate average and peak water demand for a community.
4. Design a comprehensive water treatment and distribution system to purify and distribute water to the required quality standards.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Garg, S.K., "Water Supply Engineering", Khanna Publishers, 5th Edn, 1992
2. Garg. S.K, "Waste Water Treatment" - Khanna Publishers, 4th Ed., 1992
3. Punmia B.C. and Ashok Kumar Jain, "Environmental Engineering- I / II", Arihant Publications, 3rd Edn, 1995

Reference Books:

1. Hammer and Hammer, "Water Technology", Mc Graw Hill Publications
2. Metcalf and Eddy, "Wastewater Treatment- Disposal and Reuse", Tata McGraw Hill Publications 2003
3. Howard S. Peavy, Donald R. Rowe. George Techno Bano Glous, "Environmental Engineering" - McGraw Hill International Ed

Course Title: Landscape Design and Planning

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VI

Subject Code	17CT654	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students;

1. To understand the components and types in landscape design and construction.
2. To apply the factual knowledge of design and construction of landscaping for improving aesthetic quality of the structure.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Man and the landscape: Landscape Development in Historical perspective – brief review of development of garden styles. Importance and role of landscape in Architecture. Contemporary approach to landscape design-a brief review of evolution of concepts in landscape design after industrial revolution and increasing awareness of ecological variable in landscape design.	**12 Hours**	**L1,L2**
Module -2:		
Site studies and site planning Understanding different site characteristics and evaluation of their potential for development. Philosophical and design issues related to site development – i.e., siting of buildings, spatial and con-textural relationships of built and outdoor spaces, site and its relationship to its surroundings, Importance of climatic, social factors in development of site. Process of design development, identifying functional requirements of site, development of site by mutual exploitation of forms and use of grading principles. (Study should includes at least two exercises in site planning).	**08 Hours**	**L1,L2**

Module-3:		
Elements in Landscape Design: Use of landform, water, vegetation as elements Landscape design. Design and types of garden furniture, lighting and water feature. Pavement types and patterns and hard landscapes. Sculptures and architectural features as elements. Design concept related to use of landscape elements in outdoor design – Grouping of elements, visual effects etc.	**08 Hours**	**L1,L2**
Module -4:		
Plants and design Botanical nomenclature, anatomy and physiology. Plant growth and development, plant communities and their environments in Indian Context. Plants and landscape – Basic principles, Appearance of plants, functional and visual effects with plants in landscape. Landscape layout and planting t techniques. Planting design in practice.	**08 Hours**	**L1,L2**
Module -5:		
Landscape Construction Elementary knowledge of grading, cut and file, shaping the site. Use of materials use in landscape and their details. Laying paths with different materials like pebble paving slabs stone etc. Construction of garden steps. Construction of detailing of drain inlets, curbs and gutter details. Fountain and pool construction. Elementary knowledge of irrigation systems, and water supply, lighting systems.	**08 Hours**	**L1,L2**
Course outcomes: After studying this course, students will be able to; 1. Decribe the components and types in landscape design and construction. 2. Practise knowledge of design and construction of landscaping for improving aesthetic quality of the structure.		

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Site Planning – Kevin Lynch
2. An Introduction to Landscape Architecture – Michael Laurie.
3. Landscape Construction and detailing – Alan Blanc

Reference Books:

1. T.S.S. for Landscape Architecture.
2. Planting Design – Bian Hacheat.
3. Land and Landscape Brenda Colise
4. Common trees – Santapaer
5. Beautiful Shrubs – Pratibha Devi

Course Title: OPERATION RESEARCH

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VI

Subject Code	17CT661	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students;

1. To understand the basic concepts of optimization techniques in construction industry.
2. To apply the techniques for different operations for successful completion of construction projects

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
INTRODUCTION: Linear programming, Definition, scope of Operations Research (O.R) approach and limitations of OR Models, Characteristics and phases of OR Mathematical formulation of L.P. Problems. Graphical solution methods. **LINEAR PROGRAMMING PROBLEMS:** The simplex method - slack, surplus and artificial variables. Concept of duality, two phase method, dual simplex method, degeneracy, and procedure for resolving degenerate cases.	**08 Hours**	**L1,L2,L3,L4**
Module -2:		

TRANSPORTATION PROBLEM: Formulation of transportation model, Basic feasible solution using different methods, Optimality Methods, Unbalanced transportation problem, Degeneracy in transportation problems, Applications of Transportation problems. Assignment Problem: Formulation, unbalanced assignment problem,Travelingsalesmanproblem.	**08 Hours**	**L2,L3,L4**
Module-3:		
SEQUENCING: Johnsons algorithm, n - jobs to 2 machines, n jobs 3machines, n jobs m machines without passing sequence. 2 jobs n machines with passing. Graphical solutions priority rules. **QUEUING THEORY:** Queuing system and their characteristics. The M/M/1 Queuing system, Steady state performance analyzing of M/M/ 1 and M/M/C queuing model.	**08 Hours**	**L2,L3,L4**
Module -4:		
PERT-CPM TECHNIQUES: Network construction, determining critical path, floats, scheduling by network, project duration, variance under probabilistic models, prediction of date of completion, crashing of simple networks.	**08 Hours**	**L2,L3,L4**
Module -5:		
GAME THEORY: Formulation of games, Two Person-Zero sum game, games with and without saddle point, Graphical solution (2x n, m x 2 game), dominance property. **INTEGER PROGRAMMING:** Gommory's technique, branch and bound logarithm for integer programming problems, zero one algorithm.	**08 Hours**	**L2,L3,L4**
Course outcomes: After studying this course, students will be able to; 1. Describe the concepts of optimization techniques in construction industry. **2.** Demonstrate the techniques for different operations for successful completion of construction projects.		

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Operations Research and Introduction,Taha H. A. – Pearson Education edition
2. Operations Research, S. D. Sharma –KedarnathRamnath& Co 2002.
3. Recommended Reference Materials
4. "Operation Research"AMNatarajan, P. Balasubramani, A Tamilaravari Pearson 2005.
5. Introduction to Operation Research, Hiller and liberman, McGraw Hill. 5th edition 2001.
6. Operations Research: Principles and practice: Ravindran, Phillips & Solberg, Wiley India lts, 2nd Edition 2007.
7. Operations Research, Prem Kumar Gupta, D S Hira, S Chand Pub, New Delhi, 2007.

Course Title: Environmental Impact Assessment

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VI

Subject Code	17CT662	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students;

1. To study the concepts of EIA study for different types of developmental activities.
2. To understand the environmental attributes, methodology of EIA study.
3. To apply the knowledge of EIA to find the impact of development activities on environment.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Development Activity and Ecological Factors EIA, Rapid and Comprehensive EIA, EIS, FONSI. Need for EIA Studies, Baseline Information, Step-by-step procedures for conducting EIA, Limitations of EIA.	**08 Hours**	**L1,L2**
Module -2:		
Frame work of Impact Assessment. Development Projects-Environmental Setting, Objectives and Scope, Contents of EIA, Methodologies.	**08 Hours**	**L1,L2**
Module-3:		
Techniques of EIA.Assessment and Prediction of Impacts on Attributes Air, Water, Noise, Land Ecology, Soil, Cultural and Socio-economic Environment. EIA guidelines for Development Projects, Rapid and Comprehensive EIA.	**08 Hours**	**L1,L2**
Module -4:		

Public Participation in Environmental Decision making. Practical Considerations in preparing Environmental Impact Assessment and Statements. Salient Features of the Project Activity-Environmental Parameter Activity Relationships- Matrices.	**08 Hours**	**L2,L4**
Module -5:		
EIA for Water resource developmental projects, Highway projects: Nuclear-Power plant projects, Mining project (Coal, Iron ore), Thermal Power Plant, Infrastructure Construction Activities.	**08 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to;

1. Recall the concepts of EIA study to be followed for developmental activities.
2. Identify the environmental attributes, methodology to implement in EIA study.
3. Formulate EIA plans to predict the impact of development activities on environment.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Reference Books:

1. Environmental Impact Analysis-Jain R.K.-Van Nostrand Reinhold Co.
2. Environment Impact Assessment.- Anjaneyalu. Y.
3. Guidelines for EIA of developmental Projects Ministry of Environment and Forests, GOI.
4. Environment Impact Assessment - Larry W. Canter - McGraw Hill Publication

Course Title: Human Resource Management

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VI

Subject Code	17CT663	I.A. Marks	20
Number of Lecture Hours/Week	03	Exam. Marks	80
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students;

1. Understand current issues, trends, practices, and processes in planning and managing key human resource functions within organizations
2. Contribute to employee performance management and organizational effectiveness to improve employability skills.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Organizational Behaviour: Nature of organizational behaviour: Definition key elements, scope, model. Stages of evolution of OB, Researches in OB. Foundations of Individual Behaviour: Personality, Perception, Learning Attitudes, Values and Job satisfaction, Concepts of motivation. Foundations of Group Behaviour: Small groups in an organization, Leadership, Power and Politics, Communication, Conflict. Organization: Organization culture, work stress, organizational changes and development.	**08 Hours**	**L1,L2**
Module -2:		
Introduction to Human Resource Management: Introduction, Concept of Human Resource Management, Scope of Human Resource Management, History of Human Resource Management, Function of Human Resource Management, Role of HR Executives HRM in India: Introduction, Changing Role of Human Resource in India, Globalization, Its Impact on HR.	**08 Hours**	**L1,L2**

Module-3:		
Human Resource Planning: Process of Human Resource Planning, Need for Human Resource Planning, HR Forecasting Techniques, Successful Human Resource Planning Recruitment and Selection: Concept of Recruitment, Factors Affecting Recruitment, Sources of Recruitment, Recruitment Policy, Selection, Selection Process, Application Forms, Selection Test, Interviews, Evaluation, Placement, Induction	**08 Hours**	**L1,L2**
Module -4:		
Training and Management Development: Meaning of Training, Area of Training, Methods of Training, Concept of Management Development, Management Development Methods, Differences Between Training and Development, Evaluation of Training and Management Development Employee Career Planning and Growth: Concept of Employee Growth, Managing Career Planning, Elements of a Career Planning Programme, Succession Planning Performance Appraisal: Concept and Need for Performance, Reviews, Overview of Performance Appraisal, Types of Appraisal Methods, 360 degree appraisal, Benefits	**08 Hours**	**L1,L2**
Module -5:		
Compensation Management: Wage and salary Administration, Managing wages, concept of rewards and incentives, Managing Benefits in Organizations Job Evaluation: Concept of Job Evaluation, Objectives, Techniques, Advantages and Limitations, Introduction to Competency Human Resource Information System: Introduction, Concept, Components, Types, Application, Implementation, Benefits, Impact Employee Misconduct and Disciplinary Procedure: Meaning and Objectives of Discipline, Principles for Maintenance of Discipline, Basic Guidelines of a Disciplinary Policy, Disciplinary Action – Penalties, Procedure for Disciplinary Action	**08 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to;

1. Identify current issues, trends, practices, and processes in planning and managing key human resource functions within organizations.
2. Practise techniques foremployee performance management and organizational effectiveness to develop employability skills.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Reference Books:

1. Aswathappa A., (2000) "Organizational Behaviour: Texts and cases Himalaya Publishing House, Mumbai.
2. Hersey Paul, Kenneth Blanchard H., "Management of Organizational Behaviour: Utilising Human Resources", Prentice Hall India Ltd. Edition, New Delhi.
3. Davis Keith, "Human Behaviour at work: Organizational Behavior", Tata-McGraw Hill, New Delhi.
4. Gupta N.S., "Organization: Theory and Behaviour", Himalaya Publishing House, Mumbai.
5. Pareek Uday, Rao T.V., Pestonji D.M., (1996) "Behavioral Process in Organisations", Oxford-IBH Publishing Company.
6. Tyagi Archana, "Organisational Behaviour", Excel Books, New Delhi.
7. Aswathappa K., (1997)" Human Resource and Personnel Management", Tata - McGraw Hill, New Delhi.
8. Mirza S. Sayadin, (1988) "Human Resource Management", Tata McGraw Hill Book Company, New Delhi.
9. Suri S.K. (1988) "Human Resource Development and Productivity: New Perspective", National Productivity Council, Delhi.
10. Rao Subba P, (1999) Essential of HRM and Industrial Relations, "Text cases and Games", Himalaya Publishing house, II Edition.

11. 11. Gupta C.B., (2003) "Human Resource Management", Sultan Chand and Sons, New Delhi

Course Title: CONSTRUCTION TECHNOLOGY LABORATORY

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VI

Subject Code	17CTL67	I.A. Marks	40
Number of Lecture Hours/Week	03 (1hr I + 2hr P)	Exam. Marks	60
Total Number of Lecture Hours	42	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students;

Apply the procedural knowledge of construction activities to adhere to quality and good workmanship in works such as masonry, concreting and bar bending**.**

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Construction of Masonry: Bonding patterns (Joints Alignment, Level and Plumb maintenance) Constructing wall panels, New CBR method standard Procedure.	**10 Hours**	**L1,L2,L3,L4**
Module -2:		
Plastering: Mixing Technique of applying plaster using trowel, float etc, Plastering vertical surface to plumb.	**06 Hours**	**L2,L3,L4**
Module -3:		
Concreting: Batching mixing and placing concrete Strength Tests- Compression, Split Tensile and Flexure Strength NDT of Concrete Specimen- Rebound Hammer & Ultrasonic Pulse Velocity Test	**10 Hours**	**L1,L2,L3,L4,L5**
Module -4:		
Mortar: Flow table test of mortar, Compressive strength of mortar cubes	**06 Hours**	**L2,L3,L4,**
Module -5:		
Bar bending: Straightening, bending, hooking demo for slab, beam and column construction, Lapping. Bar bending Schedule preparation (Slab, Beam& Lintel)	**10 Hours**	**L2,L3,L4**

Course outcomes:

After studying this course, students will be able to;

Practise the procedural knowledge of construction activities to adhere to quality and good workmanship in works such as masonry, concreting and bar bending.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will **two** questions from any module.
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module.
- Module-1: 40 Marks, Module-2: 40 Marks.
- The students shall answer two full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. MOHAN RAJ AND JAI SINGH, "Advanced Building Materials and Construction", CBRI Publications, Roorkee.
2. B.C. PUNMIA, "Building Construction", Lakshmi Publications, New Delhi.

Course Title: COMPUTER APPLICATION LABORATORY

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VI

Subject Code	17CTL68	I.A. Marks	40
Number of Lecture Hours/Week	03 (1hr Instructions + 2hr Drawing)	Exam. Marks	60
Total Number of Lecture Hours	42	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students;

Understand the software required for estimating the quantities of different works and scheduling of different works for successful completion of construction projects.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
MS Excel: Use basic Windows operations such as how to view toolbars, Spell Check, Open, New, Save, Save As, Print, Print Preview, Page Setup, Headers, Footers, Undo, etc. Enter data and formulas to create an accurate spreadsheet Update and format an existing spreadsheet (Editing--Cut, Paste, Copy, Paste, Font, Borders And Shading, Number Format, Column Width, Center Across Columns, Alignment, Indent, Format Painter, etc.) Use templates, wizards, Work with data bases and use data sort or filters to manipulate information in a spreadsheet. Create graphs for reports and presentations (column, bar, pie, three-dimensional, etc.). Development of spreadsheet for Estimation and Design of basic structural elements	**12 Hours**	**L1,L2,L4**
Module -2:		
MICROSOFT PROJECT SCHEDULING 1. INTRODUCTION TO PROJECT MANAGEMENT 2. CREATING CALENDER 3. TASK AND ITS RELATIONSHIP 4. WORK BREAKDOWN STRUCTURES 5. CONSTRAINTS & RECURRING TASK 6. DEFING AND ASSIGN RESOURCES 7. RESOURCE ANALYSIS & LEVELLING 8. TRACKING 9. EARNED VALUE ANALYSIS 10. MULTIPLE PROJECTS 11. CUSTOMISATION & FORMATTING 12. REPORTS	**30 Hours**	**L2,L3,L4,L5**

Course outcomes:

After studying this course, students will be able to;

Use the software required for estimating the quantities of different works and scheduling of different works for successful completion of construction projects.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will **two** questions from any module.
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module.
- Module-1: 30 Marks, Module-2: 50 Marks.
- The students shall answer two full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

- Microsoft Office Excel, Microsoft Corporation.
- MS Project - User manual, Microsoft Corporation.

Course Title: BUILDING SERVICES-II

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VII

Subject Code	17CT71	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03
CREDITS – 04		Total Marks-100	

Course objectives: This course will enable students;

1. To gain the knowledge of concepts of different services in buildings.
2. To comprehend concepts of Elevators & Escalators, their types, working principle & design principles and type of energy conservation technologies suitable for buildings.
3. To determine factors of building services like ventilation, thermal comfort & illumination in buildings.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Ventilation: Definition, Necessity, Functional Requirements of Ventilation, Types of Ventilation- Natural Ventilation and Artificial Ventilation Sound Amplification Equipments- Necessity, Factors affecting, Mechanism of sound amplification, Types of sound amplification equipments	**10 Hours**	**L1,L2,L4**
Module -2:		
Thermal comfort in buildings- factors affecting, heat transfer through buildings, thermal properties of building materials, insulation materials for buildings Communication systems- terminologies, necessity, systems of communication.	**10 Hours**	**L2,L4**
Module-3:		
Illumination of buildings- definition, laws of illumination, principles of illumination, artificial lighting, day lighting, flood lighting, Introduction to various types of lamps	**10 Hours**	**L2,L4**
Module -4:		

Elevators – Components of an typical elevator, types, working principle, principles of design of an elevator Escalator- necessity, Components of a typical escalator, working principle, design considerations	**10 Hours**	**L2,L3,L4**
Module -5:		
Energy conservation in buildings - Necessity - Advantages and Limitations - Introduction to Zero Energy Buildings& Green Buildings - Energy efficient building design- Passive solar design technique, Thermal storage, Cooling strategies, high performance insulation. - LEED Certification for buildings	**10 Hours**	**L2,L4**

Course outcomes:

After studying this course, students will be able to;

1. Describe the basic concepts of different services , their components & types used in buildings
2. Choose & suggest type of elevators & escalators based on working principle & design principles and type of energy conservation technologies suitable for buildings
3. Prepare the design factors for providing ventilation, thermal comfort & illumination in construction of buildings.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Mechanical and Electrical Systems in Buildings, by Tao, Prentice Hall publications
2. Building construction by B.C.Punmia, Laxmi Publications.
3. A Text Book on Building Construction by P.C.Varghese, Prentice Hall of India publications
4. Architectural Lighting by Bran David.

Reference Books:

1. Mechanical Services for Buildings by Eastop, Longman Publications.
2. IS SP41and SP32-hand book on functional requirements of buildings

Course Title: DESIGN OF STEEL STRUCTURES

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VII

Subject Code	17CT72	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03
CREDITS – 04		Total Marks-100	

Course objectives: This course will enable students to;

1. Gain the knowledge of specifications and various types of connections in steel structures
2. Be able to design the different of types of connections in steel structures.
3. Be capable to apply the design concepts in design of steel structural members as per relevant IS codes.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
INTRODUCTION: Advantages and Disadvantages of Steel structures, Loads and Load combinations, Design considerations, Limit State Method of design, Failure criteria for steel, Codes, Specifications and section classification. **BOLTED CONNECTIONS**: Introduction, Behaviour of Bolted joints, Design strength of ordinary Black Bolts, Design strength of High Strength Friction Grip bolts (HSFG), Pin Connections, Simple Connections, Moment resistant connections, Beam to Beam	**10 Hours**	**L1,L2,L3**

connections, Beam and Column splices, Semi rigid connections		
Module -2:		
WELDED CONNECTIONS: Introduction, Welding process, Welding electrodes, Advantages of Welding, Types and Properties of Welds, Types of joints, Weld symbols, Weld specifications, Effective areas of welds, Design of welds, Simple joints, Moment resistant connections, Continuous Beam to Column connections, Continuous Beam to Beam connections, Beam Column splices, Tubular connections.	**10 Hours**	**L2,L3**
Module-3:		
Plastic Behaviour of Structural Steel: Introduction, Plastic theory, Plastic hinge concept, Plastic collapse load, conditions of plastic analysis, Theorem of Plastic collapse, Methods of Plastic analysis, Plastic analysis of continuous beams. **Design of Tension Members**: Introduction, Types of tension members, Design of strands, Slenderness ratio, Behaviour of tension members, Modes of failure, Factors affecting the strength of tension members, Angles under tension, other sections, Design of tension member, Lug angles, Splices, Gussets.	**10 Hours**	**L2,L3**
Module -4:		
Design of Compression Members: Introduction, Failure modes, Behaviour of compression members, Elastic buckling of slender compression members, Sections used for compression members, Effective length of compression members, Design of compression members, built up compression members.	**10 Hours**	**L1,L2,L3**
Module -5:		
Design of Column Bases: Design of simple slab base and gusseted base **Design of Beams**: Introduction, Beam types, , Lateral stability of beams, factors affecting lateral stability, Behaviour of simple and built-up beams in bending(without vertical stiffeners), Design strength of laterally supported beams in Bending, Design strength of laterally unsupported beams, Shear strength of steel beams, Maximum deflection, Design of beams and purlins.	**10 Hours**	**L2,L4**
Course outcomes: After studying this course, students will be able to; 1. Select the required IS specification in steel structural design. 2. Demonstrate the procedural knowledge to design a system, component or process as per		

needs and specifications of various steel elements subjected to various load combinations.

3. Design of tension and compression members by following codal provisions in the analysis, design and detailing of steel elements.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.
- The designs are as per IS-800 and SP-6(Steel tables)to be provided in the question paper.

Reference Books:

1. Design of Steel Structures, N.Subramanian, Oxford, 2008
2. Limit State Design of Steel Structures. Duggal TATA Megra Hill 2010
3. Bureau of Indian Standards, IS800-2007, IS875-1987
4. Steel Tables

Course Title: ESTIMATION & COSTING

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VII

Subject Code	17CT73	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03
CREDITS – 04		Total Marks-100	

Course objectives: This course will enable students;

1. To gain the procedural knowledge of rate analysis & specifications for the various items of works in buildings.
2. To compute quantity of earthwork for road works.
3. To solve engineering problems in estimation of quantities of buildings & RCC structures by understanding drawing details with procedural knowledge of long wall- short wall & center line method.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
PART-A		
Module -1:		
Introduction Definition of estimation, necessity, Types of estimate and Data required. Overhead charges, contingencies, water charges, day work. General rules for the measurements and its units of different items of civil engineering work. Administrative approval – Technical sanction. Nominal muster roll, measurement books – procedure for recording and checking measurements – preparation of bills	**10 Hours**	**L1,L2,L4**
Module -2:		
Specifications: Definition of specifications, objective of writing specifications, essentials in specifications, general and detail specifications of common item of works in buildings. **Rate Analysis:** Definition and purpose. Working out quantities and rates for the following standard items of works – earth work in different types of soils, cement concrete of different mixes, bricks and stone masonry, flooring, plastering, RCC works, centering and form work for different RCC items, wood and steel works for doors,	**10 Hours**	**L2,L4**

windows and ventilators.		
PART-B		
Module-3:		
Detailed Estimation Methods of taking out quantities and cost – center line method. Preparation of detailed and abstract estimates for the following Civil Engineering works – Buildings – RCC framed structures with flat, sloped RCC roofs with all Building components	**10 Hours**	**L1,L2,L4**
Module -4:		
Detailed Estimation: Methods of taking out quantities and cost – long and short wall method or crossing method. Preparation of detailed and abstract estimates for the following Civil Engineering works – Buildings – RCC framed structures with flat, sloped RCC roofs with all Building components	**10 Hours**	**L1,L2,L4**
PART-C		
Module -5:		
Estimates: Steel truss (Fink and Howe truss), manhole and septic tanks, RCC Culverts. **Measurement of Earthwork for Roads:** Methods for computation of earthwork – cross sections – mid section formula or average end area or mean sectional area, trapezoidal &prismoidal formula with and without cross slopes.	**10 Hours**	**L1,L2,L4**

Course outcomes:

After studying this course, students will be able to;

1. Have the procedural knowledge of rate analysis & specifications of various items of works in buildings.
2. Determine the quantity of earthwork for road works.
3. Estimate the quantities of buildings & RCC structures by procedural knowledge of long wall-short wall method & center line method.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have **3 parts (Part-A, Part-B & Part-C)** comprising of total **seven** questions.There will be two full questions (with a maximum of three subdivisions, if necessary) from each Module 1, Module 2(Part-A) and from Module 5(Part-C). There will be **one compulsory question** from combined Module 3 and Module 4(Part-B). Total comprising of **seven** questions
- Module 1, Module 2 and Module 5, each full question carries 16 Marks. Module 4 and Module 5-combined question carry 32 marks
- Each full question shall cover the topics as a module.
- The students shall answer **four** full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Reference Books:

1. Estimating & Costing, B. N. Dutta, Chand Publisher
2. QuantitySurveying-P.L.Basin S. Chand: New Delhi.
3. Estimating & Specification - S.C. Rangwala: Charotar publishing house, Anand.
4. Text book of Estimating & Costing- G.S. Birde, Dhanpath Rai and sons, New Delhi.
5. A text book on Estimating, Costing and Accounts- D.D. Kohli and R.C. Kohli S. Chand: New Delhi.
6. Contracts and Estimates, B. S. Patil, University Press, 2006

Course Title: Construction Methods and Equipments

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VII

Subject Code	17CT74	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03
CREDITS – 04		Total Marks-100	

Course objectives: This course will enable students to;

1. Understand the significance of construction equipments used for construction activities.
2. Use the suitable type of construction equipment for executing construction works.
3. Apply the knowledge of trenchless technologies in construction works.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Construction Equipment Management Identification, construction economy, construction planning, importance of planning,lack of planning, types of planning, equipment management in projects, classificationof equipments, selection of construction equipments, cost of owing and operating, economic life of equipments, cost control of equipments, depreciation analysis.	**10 Hours**	**L1,L2**
Module -2:		
Equipment for Earthwork Fundamentals of Earth Work Operations, Machines for preliminary work, types of Earth Work Equipments Tractors – Basic parts and operation Scrapers – types, construction, operation and applications. Motor Graders – construction, operation and safety Power Shovel – types, basic parts, operation of shovel, selection of type, size of power shovel and factors affecting the output of power shovel, methods of improving the output of power shovel. Dragline – types, basic parts and operation. Clamshells - Classification	**10 Hours**	**L2,L2**

Hoe – basic parts, operation and application. Bulldozer – Classification, selection of type of bulldozer and out of bulldozer.		
Module-3:		
Other Construction Equipment Equipment for Dredging- Classification, construction and operation Trenching – types, operation, selecting suitable equipment and trench safety. Tunnelling - aspects for construction of tunnels Drilling – types of drills (operation), factors affecting selection of drilling equipments. Blasting – general terms, explosives (type of explosives), blasting operation, Transporting, handling and storing of explosives.	**10 Hours**	**L2,L2**
Module -4:		
Equipment for Compaction – Introduction, specification and types of compacting equipments. Foundation grouting – purpose, exploring the need of grouting, rate of grouting, materials used for grouting, equipments of cement grouting and effectiveness of grouting. Dewatering – types, Pumping Equipments – factors in selecting construction pump and classification	**10 Hours**	**L1,L2**
Module -5:		
Introduction to Trenchless Technology: Box pushing technology, micro tunnelling, moling, cured-in-place pipe (CIPP), Pipe Bursting, Pipe Jacking - Case Studies	**10 Hours**	**L2,L4**

Course outcomes:

After studying this course, students will be able to;

1. Describe the knowledge of construction equipment used in construction activities.
2. Identify the suitable construction equipment for completing the task in construction works
3. Practise the trenchless technologies to execute construction works.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Reference Books:

1. B.Satyanarayana and S.C.Saxena., Constructin, Planning and Equipements, Standard Publishers New Delhi. 1985.
2. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., Construction. Planning, Equipment and Methods, 5th Edition, McGraw Hill, Singapore, 1995.
3. Sharma S.C. Construction Equipment and Management, Khanna Publishers, New Delhi, 1988
4. Deodhar, S.V. Construction Equipment and Job Planning, Khanna Publishers, New Delhi, 1988
5. Dr. Mahesh Varma, Construction Equipment and its planning and Application, Metropolitan Book Company, New Delhi, 1983.

Course Title: Design of Prestressed Concrete Structures

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VII

Subject Code	17CT751	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students to;

1. Understand the effectiveness of the design of PSC elements based on various losses of PSC.
2. Be capable to design PSC elements for different requirements as per codal provisions
3. Be capable to analyze the PSC element, its efficiency and stresses encountered in PSC element during transfer and at working.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
MATERIALS: High strength concrete and steel, Stress-Strain characteristics and properties. **BASIC PRINCIPLES OF PRESTRESSING:** Fundamentals, Load balancing concept, Stress concept, centre of Thrust. Pre-tensioning and post tensioning systems, tensioning methods and end anchorages.	**08 Hours**	**L1,L2**
Module -2:		

ANALYSIS OF SECTIONS FOR FLEXURE: Stresses in concrete due to pre-stress and loads, stresses in steel due to loads, Cable profiles. **LOSSES OF PRE-STRESS:** Various losses encountered in pre-tensioning and post tensioning methods, determination of jacking force.	**08 Hours**	**L2,L3**
Module-3:		
DEFLECTIONS: Deflection of a pre-stressed member – Short term and long term deflections, Elastic deflections under transfer loads and due to different cable profiles. Deflection limits as per IS 1343. Effect of creep on deflection, load verses deflection curve, methods of reducing deflection **LIMIT STATE OF COLLAPSE:** Flexure -IS Code recommendations – Ultimate flexural strength of sections.	**08 Hours**	**L1,L2,L3**
Module -4:		
LIMIT STATE OF COLLAPSE (Continued....); Shear - IS Code recommendations, shear resistance of sections, shear reinforcement. Limit state of serviceability – control of deflections and cracking. **DESIGN OF END BLOCKS:** Transmission of prestress in pretensioned members, transmission length, Anchorage stress in post-tensioned members.	**08 Hours**	**L1,L2,L3**
Module -5:		
DESIGN OF END BLOCKS (Continued....);Bearing stress and bursting tensile force-stresses in end blocks-Methods, I.S. Code, provision for the design of end block reinforcement. **DESIGN OF BEAMS:** Design of pre-tensioned and post-tensioned symmetrical and asymmetrical sections. Permissible stress, design of prestressing force and eccentricity, limiting zone of pre-stressing force cable profile	**08 Hours**	**L1,L2,L3**

Course outcomes:

After studying this course, students will be able to;

1. Define the concepts of various losses for design of PSC elements.
2. Compute the loads of PSC elements for suitable requirements as per codal provisions
3. Examine the PSC element, its efficiency and stresses encountered in PSC element during transfer and at working.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.
- The designs are as per IS-1343 to be provided in the question paper.

Reference Books:

1. Pre-stressed Concrete- N. Krishna Raju - Tata Mc. Grawn Publishers.

2. Pre-stressed Concrete- P. Dayarathnam : Oxford and IBH Publishing Co.

3. Design of pre-stressed concrete structures- T.Y. Lin and Ned H. Burns - John Wiley & Sons, New York.

4. Fundamental of pre-stressed concrete- N.C. Sinha & S.K. Roy

5. IS: 1343: 1980

6. Pre-stressed Concrete- N. Rajgopalan

Course Title: Bridge Engineering

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VII

Subject Code	17CT752	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students to;

1. Understand the significance of bridges, types and uses in construction.
2. Comprehend the constructional procedure of bridges and its elements
3. Apply the design concepts in designing of bridges as per the IRC codal provision.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
INTRODUCTION: Classification of Bridges – Masonry, Arches, RCC, Prestressed Concrete Steel and Composite Brief Description of different types of bridges – preliminary Design principles. **INVESTIGATIONS:** Selection of sites, Design data to be followed, Hydraulic design, linear waterway afflux – Economic span.	**08 Hours**	**L1,L2**
Module -2:		
FOUNDATIONS: Depth of scour – Depth of foundation – Types of foundation (Pie, Raft, Well and Caisson – Brief Description only) cofferdam, Design criteria – load bearing capacity of well caissons. **SUBSTRUCTURE:** Types of Abutment, piers, wing walls – Forces action on them Stability consideration and empirical designs – Bank connection and protection works	**08 Hours**	**L1,L2**
Module-3:		

STANDARD LOADS: IRC and Railway Loadings – Equivalent Loading for preliminary design – Impact effect. **CONSTRUCTION AND MAINTENANCE OF BRIDGES:** Form work and False work for concrete Bridges – Maintenance of bridges – Maintenance.	**08 Hours**	**L1,L2**
Module -4:		
BEARINGS, JOINTS AND APPURTENANCES Importance of bearings, bearings for slab bridges, bearings for girder bridges, expansion bearings, fixed bearings, elastomeric bearings, elastomeric pot bearings, bearings for skew bridges, joints and appurtenances.	**08 Hours**	**L1,L2**
Module -5:		
TEMPORARY AND MOVABLE BRIDGES Temporary bridges, timber bridges, temporary causeways, military bridges, floating bridges, pontoon bridges, movable bridges	**08 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to;

1. Recall the suitable requirements, types, its elements in construction.
2. Translate the procedural knowledge of bridge construction & its elements in actual field conditions.
3. Analyze the design factors in bridge construction as per the IRC codal provision.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module.
- The students shall answer five full questions, selecting one full question from each module. If more

than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

- IRC 6 – 2000 Standard Specifications And Code Of Practice For Road Bridges Section II Loads and Stresses, The Indian Road Congress New Delhi.

Reference Books:

1. A Text Book of Bridge Engineering by Victor Oxford and IBH Pub. Co. New Delhi.
2. Introduction to Bridge Engineering by BindraDhanpat Rai Pub. New Delhi.
3. Design of RCC Bridges by Vazirani
4. IRC Codes 5 Bridges, 6 Bridges – Rangwala
5. Design of Steel Structures by Krishnamachar and Sharma
6. Design of Bridge by Dr. N. Krishna Raju

Course Title: Alternate Building Materials and Technologies

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VII

Subject Code	17CT753	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students to;

1. To gain the knowledge about the basic building materials, properties and their applications.
2. To understand different types of masonries and their applications.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
INTRODUCTION: Energy in building materials, Environmental issues concerned to building materials, Global warming and construction industry, Environmental friendly and cost effective building technologies., Requirements for building of different climatic regions, Traditional building methods and vernacular architecture. **ALTERNATIVE BUILDING MATERIALS:** Characteristics of building blocks for walls, Stones and Laterite blocks, Bricks and hollow clay blocks, Concrete blocks, Stabilized blocks: Mud Blocks, Steam Cured Blocks, Fal-G Blocks and Stone Masonry Blocks.	**08 Hours**	**L1,L2**
Module -2:		
LIME-POZZOLANA CEMENTS-Raw materials, Manufacturing process& Properties and uses **Fibre reinforced concretes-** Matrix materials**,** Fibers : metal and synthetic**,** Properties and applications**,** Fibre reinforced plastics**,**	**08 Hours**	**L1,L2**

Matrix materials**,** Fibers: organic and synthetic**,** Properties and applications **Building materials from agro and industrial wastes-** Types of agro wastes**,** Types of industrial and mine wastes**,** Properties and applications**,** Field quality control test methods		
Module-3:		
ALTERNATIVE BUILDING TECHNOLOGIES Alternative for wall construction- Types, Construction method Masonry mortars- Types, Preparation and Properties Ferrocement and Ferro concrete building components- Materials and specifications, properties.	**08 Hours**	**L1,L2**
Module -4:		
ALTERNATIVE BUILDING TECHNOLOGIES Alternative roofing systems-Introduction, Concepts of Cool Roofs System- Construction Procedures, material specifications, uses. Filler slabs- Construction Procedures, material specifications, uses. Composite beam panel roofs- Construction Procedures, material specifications, uses. Masonry vaults and domes- Construction Procedures, material specifications, uses.	**08 Hours**	**L1,L2**
Module -5:		
COST EFFECTIVE BUILDING DESIGN Cost concepts in buildings Cost saving techniques in planning, design and construction Cost Analysis: Case studies using alternatives. **EQUIPMENT FOR PRODUCTION OF ALTERNATIVE MATERIALS** Machines for manufacture of concrete Equipments for production of stabilized blocks Moulds and methods of production of precast elements.	**08 Hours**	**L1,L2**
Course outcomes:		

After studying this course, students will be able to:

1. Memorize the basic building materials, properties and their applications.
2. Identify different types of masonries, their applications and types of cost-effective constructions.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

TEXT BOOKS:

1. Alternative building methodologies for engineers and architects, lecture notes edited: K.S. Jagadish and B.V. Venkatarama Reddy, Indian Institute of Science,Bangalore.

2. Structural Masonry by Arnold W. Hendry.

Reference Books:

1. Relevant IS Codes.

2. Alternative building materials and technologies.

3. Proceedings of workshop on Alternative building material and technology, 19th to 20th December 2003 @ BVB College of Engineering. & Tech., Hubli.

Course Title: Pre-Fabrication Construction Techniques

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VII

Subject Code	17CT754	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students to;

1. Gain the knowledge of prefab system, component or process as per the needs and specifications of different variety of prefab elements construction.
2. Comprehend the culture of professional and ethical responsibilities by following codal provisions in the analysis, design and detailing of prefab structures for strength and durability.
3. Analyze design of various types of prefab structures in actual field conditions.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Prefabricated construction, necessity, advantages disadvantages, Mass Produced steel, reinforced concrete and masonry system, industrialized buildings. Modular coordination, basic module, planning and design modules, modular grid systems	**08 Hours**	**L1,L2**
Module -2:		
National Building Code specifications, standardization, dimensioning of products, preferred dimensions and sizes, tolerances and deviations, layout and processes Prefabricates classification, foundation, columns, beams, roof and floor panels, wall panels, clay units, box prefabricates, erection and assembly	**08 Hours**	**L1,L2**
Module-3:		
Design of prefabricated elements, lift points, beams, slabs, columns, wall panels, footings	**08 Hours**	**L2,L3**

Module -4:		
Design of joints to transfer axial forces, moments and shear forces	**08 Hours**	**L1,L2,L3**
Module -5:		
Construction techniques, large panel construction, lift slab system, Glover system, Constains's jack- block system, Constain V- plate system, Bison system, Silber – Kuhi system, control of construction processes. Equipments- horizontal and vertical transportation.	**08 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to;

1. Describe prefab system, component or process as per the needs and specifications of different variety of prefab elements construction.
2. Practise the culture of professional and ethical responsibilities by following codal provisions in the analysis, design and detailing of prefab structures for strength and durability.
3. Provide factual knowledge on analysis and design of various types of prefab structures.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Reference Books:

1. Hass A.M. – Precast Concrete – Design and applications Applied Science, 1983.
2. David Shepperd – "Plant cast, Precast and Prestressed concrete – McGraw Hill, 1989.
3. Dyachenko and Mirtousky – Prefabrication of reinforced concrete – MIR Publishers.

Course Title: SOLID WASTE MANAGEMENT

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VII

Subject Code	17CT761	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives:

1. Student will be able to understand components of solid waste management and the laws governing it.
2. Students will analyse the solid waste collection systems and propose route optimization techniques and processing of solid wastes.
3. Students will be able to design, operate and maintain of landfills and composting units and categorize the techniques of operation and maintenance of incinerators.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
INTRODUCTION: Definition, Land Pollution – scope and importance of solid waste management, functional elements of solid waste management. Policy Framework in India for solid waste management **SOURCES:** Classification and characteristics – municipal, commercial & industrial. Methods of quantification	**08 Hours**	**L1,L2**
Module -2:		
COLLECTION AND TRANSPORTATION: Systems of collection, collection equipment, garbage chutes, transfer stations – bailing and compacting, route optimization techniques and problems.	**08 Hours**	**L1,L2**

TREATMENT / PROCESSING TECHNIQUES: Components separation, volume reduction, size reduction, chemical reduction and biological processing problems.		
Module-3:		
INCINERATION: Process – 3 T's, factors affecting incineration process, incinerators – types, prevention of air pollution, pyrolsis, design criteria for incineration.	**08 Hours**	**L1,L2**
Module -4:		
COMPOSTING: Aerobic and anaerobic composting, factors affecting composting, Indore and Bangalore processes, mechanical and semi mechanical composting processes, Vermi composting **SANITARY LAND FILLING:** Different types, trench area, Ramp and pit method, site selection, basic steps involved, cell design, prevention of site pollution, leachate & gas collection and control methods, geosynthetic fabrics in sanitary land fills	**08 Hours**	**L1,L2**
Module -5:		
DISPOSAL METHODS: Open dumping – selection of site, ocean disposal, feeding to hogs, incineration, pyrolsis, composting, sanitary land filling, merits and demerits, biomedical wastes and disposal. **RECYCLE AND REUSE:**Material and energy recovery operations, reuse in other industries, plastic wastes, environmental significance and reuse.	**08 Hours**	**L1,L2,L4**

Course outcomes:

After studying this course, students will be able to;

1. Describe the components of solid waste management and the laws governing it.
2. Distinguish the solid waste collection systems and prepare route optimization techniques and processing of solid wastes.
3. Develop landfills and composting units and evaluate the techniques of operation and maintenance of incinerators.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16

marks

- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Reference Books:

1. Integrated Solid Waste Management: Tchobanoglous : M/c Graw Hill.
2. Solid Waste Management in developing countries. Bhide and Sunderashan
3. Hand book on Solid Waste Disposal.: Pavoni J.L.
4. Environmental Engineering.: Peavy and Tchobanoglous
5. Environmental Engineering – Vol II.: S.K. Garg
6. Biomedical waste handling rules – 2000.
7. Solid Waste Engineering by Vesilind.Pa Worrell &Reinhart.D. – 2009, Cengage Learning India Private Limited, New Delhi

Course Title: Pavement Materials & Construction

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VII

Subject Code	17CT762	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students to;

1. Remember the materials, types & components of pavement construction for road works.
2. Understand the specifications & requirements of different types of pavements as per IS codal provisions.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
AGGREGATES: Origin, classification, requirements, properties and tests on road aggregates, concepts of size and gradation – design gradation, maximum aggregate size, aggregate blending by different methods to meet specification. **BITUMEN AND TAR:** Origin, preparation, properties and chemical constitution of bituminous road binders; requirements.	**08 Hours**	**L1,L2**
Module -2:		
BITUMINOUS EMULSIONS AND CUTBACKS: Preparation, characteristics, uses and tests. Adhesion of Bituminous Binders to Road Aggregates: Adhesion failure, mechanism of stripping, tests and methods of improving adhesion.	**08 Hours**	**L1,L2**
Module-3:		
BITUMINOUS MIXES: Mechanical properties, dense and open textured mixes, flexibility and brittleness, (no HveemStabilometer&Hubbar – Field Tests) bituminous mix, design methods using Rothfuch's Method only and specification, Marshal mixed design criteria- voids in mineral aggregates, voids in total mix, density, flow, stability, percentage voids filled with bitumen.	**08 Hours**	**L1,L2**

Module -4:		
SUBGRADE: Earthwork grading and construction of embankments and cuts for roads. Preparation of subgrade, quality control tests. **EQUIPMENT IN HIGHWAY CONSTRUCTION:** Various types of equipment for excavation, grading and compaction – their working principle, advantages and limitations. Special equipment for bituminous and cement concrete pavement and stabilized soil road construction.	**08 Hours**	**L1,L2**
Module -5:		
FLEXIBLE PAVEMENTS: Specifications of materials, construction method and field control checks for various types of flexible pavement layers. **CEMENT CONCRETE PAVEMENTS:** Specifications and method of cement concrete pavement construction (PQC Importance of providing DLC as sub-base and polythene thin layer between PQC and sub-base); Quality control tests; Construction of various types of joints.	**08 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to:

1. Describe the materials, types & components of pavement construction for road works.
2. Identify the specifications & requirements of different types of pavements as per IS codal provisions.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks

- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.
- The designs are as per IRC and relevant charts to be provided in the question paper.

TEXT BOOKS:

1. Peurifoy, R.L., and Clifford,JS "Construction Planning Equipment and Method"- McGraw Hill Book Co. Inc.

2. Sharma S.C., "Construction Equipment and its Management"- Khanna Publishers

Reference Books:

1. Freddy L Roberts, Prithvi S Kandhal et al, "Hot Mix Asphalt Materials, mixture design and construction"- (2nd Edition), National Asphalt Pavement Association Research and Education Foundation, Maryland, USA

2. National Asphalt Pavement Association "Hot Mix Asphalt Paving Hand book"- 5100 Forbes Boulevard, Lanhm, Mary Land, USA

3. "Hand Book on Cement Concrete Roads"- Cement Manufacturers Association, New Delhi

4. MoRTH "Specifications for Roads and Bridge Works"- 2001, fourth revision, Indian Roads Congress

5. MoRTH "Manual for Construction and Supervision of Bituminous Works"- 2001, Indian Roads Congress

6. MoRTH "Manual for Maintenance of Roads"- 1989, Indian Roads Congress

7. IRC: 42-1994, IRC:15-2002, IRC SP :11-1988, , 55-2001, 57-2001,58-2001, IRC 19-1977, 27-1967, 29-1988, 34-1970, 36-1970,48-1972,61-1976, 63-1976, 68-1976, 81-1997,82-1982, 84-1983,93-1985, 94-1986, 95-1987, 98-1997, 105- 1988.

Course Title: Urban Planning and Modern Architecture

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VII

Subject Code	17CT763	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students to;

1. To remember the basic components for planning of urban areas.
2. To understand the physical and aesthetic experience of buildings in order to appreciate the complexity of the influences bearing on modern architecture, as reflected by contemporary architects.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Urban Planning Introduction: evolution of planning, objects, principles and necessity of town planning, growth of towns, requirements of new towns, present position of planning in India, land use planning and neighbourhood planning.	**08 Hours**	**L1,L2**
Module -2:		
Zoning: meaning of the term zoning, objectives, principles, importance, aspects and advantages of zoning, zoning powers, transition zones **Housing**: importance, demand, requirements, low cost housing, slums-causes and effects,' clearance of slums, building bye laws	**08 Hours**	**L1,L2**
Module-3:		

Development of master plan-objectives, necessity and features of master plan, data collected, drawings prepare, stages of preparation and method of execution of development plan	**08 Hours**	**L1,L2**
Module -4:		
Modern Architecture Introduction: aim and importance of architecture, role of an engineer and an architect. Principles and qualities of architecture: the aesthetic and the functional components in architecture	**08 Hours**	**L1,L2**
Module -5:		
Vernacular architecture in India-post independent buildings, planning of new capitals Study of works of contemporary architects like Le Corbusier, rohe, Kahn, Charles Correa, B.V.Doshi-CASE STUDIES	**08 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to;

1. Describe the basic components required for planning of urban areas.
2. Distinguish the physical and aesthetic experience of buildings in order to appreciate the complexity of the influences bearing on modern architecture globally.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more

than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Town Planning by Rangwala, Charotar Publishing House Pvt.Ltd
2. Building Planning, Designing, and Scheduling, Gurucharan Singh and Jagadish Singh-Standard Publishers, New Delhi
3. Principles o architecture, MuthuShoba Mohan, Oxford University Press New Delhi
4. Bran David-Architectural Lighting

Reference Books:

1. Town and Country Planning by K.S.Ramegowda.
2. Urban Design by Gallion& Eisner
3. History of Architecture by Fletc

Course Title: Computer Applications in Construction Engineering and planning

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VII

Subject Code	17CT764	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students to;

1. Understand the use of computer software and applications in construction industry
2. Comprehend the knowledge of computer software and applications for execution of construction related activities and works.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Introduction Introduction to System Hardware – Languages – Data Base Management – Spread Sheets – Applications **Optimization Techniques** Modern Information System – System Development Life Cycle – Structured Methodologies	**08 Hours**	**L1,L2**
Module -2:		
Designing Computer Based Methods, Procedures, Control – Designing Structured Programs. **Information System** Integrated Construction Management Information System – Project Management Information System.	**08 Hours**	**L1,L2**
Module-3:		
Functional Areas, Finance, Marketing, Production, Personnel – Levels, DSS, EIS, ES – Comparison, Concepts and Knowledge Representation – Managing International Information System	**08 Hours**	**L1,L2**

Module -4:		
Implementation and Control Control – Testing Security – Coding Techniques – Defection of Error Validating – Cost Benefit Analysis – Assessing the value and risk of Information System.	**08 Hours**	**L1,L2**
Module -5:		
System Audit Software Engineering qualities – Design, Production, Service, Software specification, Software Metrics, Software quality assurance – Software life cycle models – Verification and Validation.	**08 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to:

1. Recall the knowledge of computer software and applications for execution of construction related activities and works.
2. Identify the suitable software and applications required in construction industry.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Reference Books:

1. Kenneth C. Laudon and Jane Price Laudon, Management Information Systems –Organization and Technology, Prentice Hall, 1996

2. Gordon B. Davis, Management Information System: Conceptual Foundations, Structure and Development, McGraw Hill, 1996.

3. Joyce J. Elam, Case series for Management Information Systems, Simon and Schuster, Custom Publishing, 1996.

4. Ralph H. Sprague and Huge J. Watson, Decision Support for Managers, Prentice Hall, 1996.

5. Micheal W. Evans and John J. Marciniah, Software Quality assurance and Management, John Wiley and Sons, 1987

6. Card and Glass, Measuring Software Design quality, Prentice Hall, 1990

Course Title: Building Services Laboratory

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VII

Subject Code	17CTL77	I.A. Marks	40
Number of Lecture Hours/Week	03(1I+2P)	Exam. Marks	60
Total Number of Lecture Hours	42	Exam. Hours	03
CREDITS – 02		Total Marks-100	

Course objectives: This course will enable students to;

1. To understand drawings of building services like water supply, plumbing and electrical layouts
2. To determine the intensity of sound, light, moisture of wood, velocity and quality of air at indoors & AC load for building design and construction.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
MODULE 1 1. Experiments on measurement of intensity of light in various location in buildings. 2. Experiments on measurement of intensity of sound. 3. Experiments on measurement of moisture content in different building materials. 4. Experiments to measure the velocity and quality of air at indoors	**21 HOURS**	**L1,L2,L3,L4,L5**

MODULE 2 1. Preparing draft layout by AUTO CADD sofware a. Water supply/Sanitary service building details b. Plumbing details (Sanitary line assembly and fittings) c. Electrical details 2. Demonstration of electrical, Plumbing and sanitary materials as per the layout. 3. Air conditioning system-load calculations	**21 HOURS**	**L1,L2,L3,L4,L5**

Course outcomes:

After studying this course, students will be able to:

1. Draw and demonstrate drawings of building services like water supply, plumbing and electrical layouts in actual site conditions.
2. Measure &analyse the intensity of sound, light, moisture of wood, velocity and quality of air at indoors & AC load for building design and construction.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 2 modules comprising of 4 questions.
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module.
- Module-1: 40 Marks, Module-2: 40 Marks.
- The students shall answer two full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Reference Books:

1. Building Services for Water Supply and Sanitation by Panchdhare.
2. Water Supply and Sanitary Engineering, by Rangawala
3. Architectural Acoustics and Noise Control – Theory, Design, Practice – Allied Publishers.
4. Mechanical and Electrical Systems by McGrainess and Stein, John Willey and Sons, 1977.

Course Title: Project Work Phase I + Seminar

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VII

Subject Code	17CTL78	I.A. Marks	100
Number of Lecture Hours/Week	03	Exam. Marks	----
Total Number of Lecture Hours	42	Exam. Hours	03
CREDITS – 02		Total Marks-100	

Project Phase-I + Seminar: The problem (analytical/ computational / experimental / design oriented / statically) shall be selected after detailed discussion with guide and H.O.D. The project shall have following features:

Literature Survey, Problem Identification, Objectives and Methodology, Submission of synopsis and seminar

The Project Phase-I report shall be submitted in the prescribed standard format shall be submitted after certification by the Guide and H.O.D.

Course Title: CONTRACTS MANAGEMENT

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VIII

Subject Code	17CT81	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03
CREDITS – 04		Total Marks-100	

Course objectives: This course will enable students to;

1. Gain knowledge of contracts management in construction industry
2. Understand the tendering process for awarding of contract in India & all over the world.
3. Apply the knowledge of resolution technique in resolving disputes in construction industry.

Modules		Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Introduction to contracts Definitions, Essentials for a legally valid contract, Salient features of a contract, Discharging of a contract, Documents for an Engineering Contract; Types of contracts: Classification Based on − Tendering Process, Economic Consideration, Tasks Involved; Main and Sub Contracts, Features, Merits, Demerits.	**10 Hours**	**L1,L2**
Module -2:		
Tendering process Definitions, List of Documents, EMD, SD, Preparation of Enquiry Documents, Invitation for Tenders, Preparation of Tender Documents and its submission, Receipt of Tender Documents and its opening, Evaluation of Tender and Award of contract – Letter of Award, Letter of Intent, Issues in tendering process: Pre - Registration, Pre – Qualification, Nominated Tendering, Rejection of Tenders.	**10 Hours**	**L1,L2,L4**
Module-3:		
Administration/Performance of contract Responsibilities (Duties and Liabilities) of Principal & Contractor, Settlement of claims − Advances, Bills, Extension for time, Extras & Variations, Cost Escalations. Security Deposit, Retention Money, Performance Bond. **Breach of contract** Definition and Classification, Common Breaches by – Principal, Contractor, Damage Assessment, Claims for Damages, Quantum Meruit, Force Majeure or Frustration.	**10 Hours**	**L1,L2,L4**

Module -4:		
Dispute resolution General, Methods for dispute resolution − Negotiations, Mediation, Conciliation, Dispute Resolution Boards, Arbitration, Litigation/Adjudication by courts. Conciliation − Appointment of Conciliator, Role of Conciliator. Arbitration – Arbitration Agreement, Terms of Reference, Arbitrator's Powers, Revocation of Arbitrator − Misconduct of Arbitrator. Case Studies	**10 Hours**	**L1,L2,L4**
Module -5:		
International contracts / contracts with international funding International Competitive Bidding, Domestic Preference, FIDIC Documents, Conditions, Currency of Bid and Payment, Escalation in Foreign Currency, Financing of projects, Applicable Law and Settlement of Disputes, International Arbitration.	**10 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to:

1. Recall the procedural knowledge of construction contracts.
2. Select the tendering process for awarding of construction contracts.
3. Practise the resolution technique for resolving disputes in construction industry.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Prakash V. A.,(1997) "Contracts Management in Civil Engineering Projects", NICMAR

2. Patil B. S.,(2009) "Civil Engineering Contracts and Estimates", University Press.

Reference Books:

1. John G. Betty(1993/ Latest Edition) “Engineering Contracts”, McGraw Hills.
2. Gt Gajria's “Law Relating to Building and Engineering Contracts in India” 2000
3. Albett Robert W., (1961/ Latest Edition) "Engineering Contracts and Specifications”, John Willey and Sons, New York.
4. Vaid K.N., (1998)"Global perspective on International Construction Contracting Technology and Project Management", NICMAR, Mumbai.

Course Title: CONSTRUCTION SAFTEY MANAGEMENT

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VIII

Subject Code	17CT82	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	50	Exam. Hours	03
CREDITS – 04		Total Marks-100	

Course objectives: This course will enable students to;

1. Understand the concepts of safety management relevant to construction industry.
2. Describe the safety practises to be followed to prevent common hazards in construction sites.
3. Apply the knowledge for designing safety management to a construction site.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Safety Management Introduction**,** salient features of safety programs, general safety programs for construction. Safe working environment, Safety clauses in contract documents, Safety programme, Safety policy, Safety department, safety officers, safety records, safety training. Safety lacunae in Indian Construction Industry **SAFETY STANDARDS** Indian standards for safety in construction, BIS standards, American National Standards.	**10 Hours**	**L1,L2**
Module -2:		
DESIGNING FOR SAFETY Safety clause in a typical contract document, Scheme for safety, Breach of safety regulations, General safety condition, Safety culture, Company activities and safety, Project co-ordination and safety procedures, Workers compensation.	**10 Hours**	**L1,L2**
Module-3:		
CONSTRUCTION ACCIDENTS AND SAFETY Accident- Causes, Effects and Safety measures, Legal requirements, Responsibility of the employers. Reporting occurrence of accidents, Reporting occurrence of hazards, Action to be taken by the Site-in-charge in case of accidents.	**10 Hours**	**L1,L2**
Module -4:		
FIRE PREVENTION AND CONTROL Understanding fire chemistry, Behaviour of fuels in fire, Fire causes, Types of extinguishers and use, Fire prevention planning, Check list for fire prevention. Emergency Escape-Means of Escape, Evacuation, Occupantfire fighting.	**10 Hours**	**L1,L2**

Module -5:		
COMMON HAZARDS Dust, Impregnated timber, Lead poisoning, Toxic fumes, Noise, Code of practice for reducing noise, Vibration, Power supply, Lighting, Maintenance, House-keeping, Materials, Movement, Drowning, Openings, Weight.	**10 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to:

1. Define the safety concepts pertaining to safety management in construction industry.
2. Illustrate the safety practises to mitigate common hazards in construction site.
3. Prepare a safety management framework for implementing in construction site.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Construction Safety Management, NICMAR Publications, Hyderabad, October 2003.

Reference Books:

1. Jimmy W. Hinze, construction safety, Prentice hall Inc 1997
2. Richard.J.Coble, Jimmoe and TheoeHampt, Construction Safety and Health Management, Prentice Hall Inc 2001.

Course Title: REPAIR& REHABILITATION OF STRUCTURES

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VIII

Subject Code	17CT831	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students to;

1. Gain knowledge of NDT techniques for condition assessment of structures for identifying damages in structures.
2. Understand the use of repair material and retrofitting strategy suitable for distress.
3. Predict causes for distress and deterioration of structures & prepare guidelines for repair management of deteriorated structures.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Assessment of Structural Strength – Need and approach, Testing methodology, Insitu testing of Structures – Methods. Nondestructive testing of concrete structures – Schmidt hammer, Ultrasonic sounding, core drilling, probes. Assessment of carbonation and permeability testing of steel, masonry and wooden structures.	**08 Hours**	**L1,L2**
Module -2:		
Diagnosis, damage assessment parameters for repair / restoration strategies, specification and detailing. Repair methods for concrete structures - slabs, beams, columns and foundations. Chemicals and materials for repair and restoration – classification – Bonding agents, adhesives Grout fillers, reinforcements polymer infrastructure fibres, etc., Tools for repairs.	**08 Hours**	**L1,L2**
Module-3:		
Earthquake and dynamic load induced damages. Bracing foundation isolation, dampers and Ductility provisions. Repair strategies- Rust eliminators and polymers coating for rebar during repair foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shot Crete Epoxy injection, Mortar repair for cracks, shoring and underpinning.	**08 Hours**	**L1,L2**
Module -4:		
Fire resistance – Fire rating – Fire damage assessment and restoration measures for concrete and steel structures, Retrofitting and Strengthening of Structures, Need, Strategies	**08 Hours**	**L1,L2**

and Techniques Retrofitting – steel and concrete bridges. Retrofitting of buildings of earthquake resistance.		
Module -5:		
Special topics – Architectural Restoration – Cracks and waterproofing, Demolition of Structures. Deconstruction of Structures, Case Studies.	**08 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to:

1. Describe NDT techniques for condition assessment of structures for identifying damages in structures.
2. Select repair material and retrofitting strategy suitable for distress.
3. Estimate causes for distress and deterioration of structures & formulate guidelines for repair management of deteriorated structures.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Repair of Concrete Structures by R.T.L. Allen & S.C. Edwards (Ed), Blackie, 1987.
2. Testing during Concrete Construction by Releur Workshop, Chapman & Hall, 1991, Rexom&Maihaganom – Et FN Spon, 1986.

Reference Books:

1. The Testing of Concrete in Structures by John M. Bungey, Survey Univ Press (Dh & Hall) 1982,
2. Structural Renovation of Buildings Details & Design Examples by Newman P.E., Methods, McGraw Hill, 2001.
3. Rehabilitation of Renovation and Reconstruction Bedle by R. Jagadeesh, ASCE /ACI Journal.

Course Title: Urban Transportation & Planning

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VIII

Subject Code	17CT832	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students to;

1. Know the land use pattern, transportation needs and forecast present conditions for future years for the development of urban transport system.
2. To generate transportation inventories and develop to solution for the trip generation using various trip distribution models.
3. To characterize the modal split and assign the trips generated of transportation means for various categories to cities and apply the latest computerial for transportation planning.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
INTRODUCTION: Scope of Urban transport planning – Inter dependency of land use and traffic – System Approach to urban planning. **URBAN TRANSPORT SURVEY** - Definition of study area-Zoning-Types of Surveys – Inventory of transportation facilities – Expansion of data from sample.	**08 Hours**	**L1,L2**
Module -2:		
STAGES IN URBAN TRANSPORT PLANNING: Trip generation – Trip production - Trip distribution – Modal split – Trip assignment. **TRIP GENERATION:** Trip purpose – Factors governing trip generation and attraction – Category analysis – Problems on above	**08 Hours**	**L1,L2**
Module-3:		
TRIP DISTRIBUTION Methods – Growth factors methods – Synthetic methods – Fractor and Furness method and problems on the above.	**08 Hours**	**L1,L2,L3**
Module -4:		
MODAL SPLIT Factors affecting – characteristics of split – Model split in urban transport planning – problems on above **TRIP ASSIGNMENT** Assignment Techniques – Traffic fore casting – Land use transport models – Lowry Model – Garin Lowry model –	**08 Hours**	**L1,L2,L3**

Applications in India – (No problems on the above)		
Module -5:		
URBAN TRANSPORT PLANNING FOR SMALL AND MEDIUM CITIES Introduction – Difficulties in transport planning – Recent Case Studies.	**08 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to:

1. Describe the land use pattern, transportation needs and forecast future development of urban transport system.
2. Summarize transportation inventories and develop to solution for the trip generation using various trip distribution models.
3. Develop the modal split and assign the trips generated of transportation means for various categories to cities and apply the latest computerial for transportation planning.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Traffic Engineering and Transport Planning- L.R. Kadiyali - Khanna Publishers.
2. Principles of Urban Transport System Planning - B.G. Hutchinson - Scripta Book Co., Washington D.C. & McGraw Hill Book Co.
3. Introduction to transportation engineering- JotinKristey and Kentlal - PHI, New Delhi.

Reference Books:

1. Urban Transport planning- Black John - Croom Helm ltd, London.
2. Urban and Regional models in geography and planning- Hutchison B G - John Wiley and sons London.
3. Entropy in urban and regional modeling- Wilson A G - Pion ltd, London.

Course Title: ADVANCED FOUNDATION ENGINEERING

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VIII

Subject Code	17CT833	I.A. Marks	40
Number of Lecture Hours/Week	03	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students ;

1. To understand the significance of foundation types in different types of structures.
2. To apply the behavioural knowledge of foundations in the actual field conditions in different types of soil conditions.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
BEARING CAPACITY & SETTLEMENT Presumptive bearing capacity according to BIS, Factors affecting bearing capacity, Factors influencing selection of depth of foundation, types of shallow foundations, Settlement of Shallow Foundations: Immediate, consolidation, & differential settlements, Factors influencing settlement, Safe Bearing Capacity and Allowable Bearing Pressure. **SHALLOW FOUNDATIONS** Principles of Design of foundation, Definition for Shallow and Deep foundation, Requirements for geotechnical and structural aspects of design, Proportioning of isolated footing, combined footing- rectangular & trapezoidal and Strap footing.	**08 Hours**	**L1,L2**
Module -2:		
PILE FOUNDATIONS – SINGLE PILE Historical Development, Necessity of pile foundations, Classification, Load bearing capacity of single pile by Static formula, Dynamic formula, Pile load test and Penetration tests, Laterally Loaded Pile. **PILE FOUNDATIONS – GROUP EFFECT** Pile groups, group action of piles in sand and clay, group efficiency of piles, settlement of piles, negative skin friction, under reamed piles.	**08 Hours**	**L1,L2**

Module-3:		
WELL FOUNDATIONS Historical Development, Different shapes and characteristics of wells, Components of well foundation. Types of well foundation,Forces acting on well foundation. Sinking of wells. Causes and remedies for tilts and shifts. **DRILLED PIERS & CAISSONS** Construction, advantages and disadvantages of drilled piers. Design concepts and Advantages & disadvantages of open, pneumatic and floating caissons.	**08 Hours**	**L1,L2**
Module -4:		
FOUNDATIONS ON EXPANSIVE SOILS Definition, Identification, Mineral Structure, Index properties of expansive soils, Swell potential and Swell pressure, Free swell, Tests on expansive soils, foundation treatment for structures in expansive soil, CNS layer.	**08 Hours**	**L1,L2**
Module -5:		
MACHINE FOUNDATIONS Basic definitions in vibration, free and forced vibrations, determination of natural frequency, types of Machine foundations, general criteria for design of machine foundation., vibration analysis of a machine foundation, degrees of freedom of a block foundation, vibration isolation and control.	**08 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to:

1. Recall the significance of foundation types in different types of structures.
2. Identify the suitable type of foundation based upon it'sbehaviour in the actual field conditions in different types of soil conditions.

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Soil Mechanics & Foundation Engineering - V.N.S. Murthy - Pub: Sai Tech.

2. Foundation Engineering - Braja M. Das – Cengage Learning.

3. Soil Mechanics Foundations - Dr. B.C. Punmia - Pub: Laxmi publications, pvt. Ltd.

Reference Books:

1. Foundation Engineering - Dr. P.C. Varghese: - Pub: Prentice Hall of India.
2. Foundation Analysis and Design - Bowles J.E. (1996) - 5th Ed, McGraw Hill Pub. Co., New York.
3. Advanced Foundation Engineering - V.N.S. Murthy - Pub : Sai Tech.
2. Pile Foundation.- Chellies
3. Geotechnical Engineering.- P. Purushotham Raj
4. Geotechnical Engineering - Dr. C. Venkataramaiah - Pub: New age Publications.

Course Title: STRUCTURAL MASONRY

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VIII

Subject Code	17CT834	I.A. Marks	40
Number of Lecture Hours/Week	04	Exam. Marks	60
Total Number of Lecture Hours	40	Exam. Hours	03
CREDITS – 03		Total Marks-100	

Course objectives: This course will enable students;

1. To understand procedural knowledge to design a system, component or process as per needs and specifications of masonry system subjected to various load combinations with different boundary conditions.
2. To follow the culture of professional and ethical responsibilities by following codal provisions in the analysis, design and detailing masonry.
3. To analyze the impact of engineering solutions on the society and will be aware of contemporary issues regarding failure of structures due to wrong design.

Modules	Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
Module -1:		
Introduction, Masonry units, materials and types: History of masonry Characteristics of Brick, stone, clay block, concrete block, stabilized mud block masonry units – strength, modulus of elasticity and water absorption. Masonry materials – Classification and properties of mortars, selection of mortars.	**08 Hours**	**L1,L2**
Module -2:		
Strength of Masonry in Compression: Behaviour of Masonry under compression, strength and elastic properties, influence of masonry unit and mortar characteristics, effect of masonry unit height on compressive strength, influence of masonry bonding patterns on strength, Failure theories of masonry under compression. Effects of slenderness and eccentricity, effect of rate of absorption, effect of curing, effect of ageing, workmanship on compressive strength	**08 Hours**	**L1,L2**
Module-3:		
Flexural and shear bond, flexural strength and shear strength: Bond between masonry unit and mortar, tests for determining flexural and shear bond strengths, factors affecting bond strength, effect of bond strength on compressive strength, orthotropic strength properties of masonry in flexure, shear strength of masonry, test procedures	**08 Hours**	**L1,L2**

Module -4:		
Design of load bearing masonry buildings: Permissible compressive stress, stress reduction and shape reduction factors, increase in permissible stresses for eccentric vertical and lateral loads, permissible tensile and shear stresses, Effective height of walls and columns, opening in walls, effective length, effective thickness, slenderness ratio, eccentricity, load dispersion, arching action, lintels; Wall carrying axial load, eccentric load with different eccentricity ratios, wall with openings, freestanding wall.	**08 Hours**	**L1,L2**
Module -5:		
Earthquake resistant masonry buildings: Behaviour of masonry during earthquakes, concepts and design procedure for earthquake resistant masonry, BIS codal provisions. Masonry arches, domes and vaults: Components and classification of masonry arches, historical buildings, construction procedure	**08 Hours**	**L1,L2**

Course outcomes:

After studying this course, students will be able to:

1. Describe procedural knowledge to design a system, component or process as per needs and specifications of masonry system subjected to various load combinations with different boundary conditions.
2. Practice the culture of professional and ethical responsibilities by following codal provisions in the analysis, design and detailing masonry.
3. Evaluate the impact of engineering solutions on the society and will be aware of contemporary issues regarding failure of structures due to wrong design

Program Objectives (as per NBA)

- *Engineering Knowledge.*
- *Problem Analysis.*
- *Interpretation of data.*

Question paper pattern:

- The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks
- There will be two full questions (with a maximum of three subdivisions, if necessary) from each module.
- Each full question shall cover the topics as a module
- The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module.

Text Books:

1. Hendry A.W., "Structural masonry"- Macmillan Education Ltd., 2nd edition
2. Sinha B.P & Davis S.R., "Design of Masonry structures"- E & FN Spon
3. Dayaratnam P, "Brick and Reinforced Brick Structures"- Oxford & IB

Reference Books:

1. Curtin, "Design of Reinforced and Prestressed Masonry"- Thomas Telford
2. Sven Sahlin, "Structural Masonry"-Prentice Hall
3. Jagadish K S, Venkatarama Reddy B V and Nanjunda Rao K S, "Alternative Building Materials and Technologies"-New Age International, New Delhi & Bangalore
4. IS 1905, BIS, New Delhi.
5. SP20(S&T),New Delhi

Course Title: CONSTRUCTION STUDY PROJECT(Internship)

[As per Choice Based Credit System (CBCS) scheme]
SEMESTER – VIII

Subject Code	17CT84	I.A. Marks	50
		Exam. Marks	50
		Exam. Hours	03
CREDITS – 02		Total Marks-100	

Course objectives: This course will enable students to;

1. Apply classroom and laboratory concepts and principles in an industry work environment.

2. To demonstrate the ability to work as a team member to successfully complete the assigned work objectives in an assigned company work group with proper work ethic.

Course Details: Study of a construction project by selecting a on-going construction site, studying and reporting various aspects of construction such as:

1. Tendering process and awarding the contract.
2. Estimation of the project.
3. Scheduling of various events of the construction project.
4. Geotechnical investigation of the site and report.
5. Study of the structural details (wherever feasible).
6. Study of the constructional process.
7. Quality control measures pertaining to the project under consideration.

Construction safety measures pertaining to the project under consideration

Period of study: 2 months

Candidates has to be officially deputed to a construction site. Student shall be evaluated both by site supervisor from construction company and teaching staff from the college. Equal weightage being given to both the valuators.

Course outcomes:

After studying this course, students will be able to:

On Completion of the internship, students will be in a position to express the ability to work as a team member to successfully complete the assigned work objectives in an assigned company work group with proper work ethic.

Course Title: PROJECT WORK

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VIII

Subject Code	17CTP85	I.A. Marks	100
		Exam. Marks	100
		Exam. Hours	03
CREDITS – 04		Total Marks-200	

Course objectives: This course will enable students;

1. To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.
2. To train the students in preparing project reports and to face reviews and viva voce examination.

The problem (analytical/ computational / experimental / design oriented / statically) shall be selected after detailed discussion with guide and H.O.D. The project shall have following features:

i. Definition of the problem

ii. Exhaustive literature survey

iii. Analysis based on type of problem (as given above)

iv. Conclusions, scope for further work

v. References.

The Project shall be submitted in the prescribed standard format and four copies shall be submitted after certification by the Guide and H.O.D.

Course outcomes:

After studying this course, students will be able to:

On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

Course Title: SEMINAR

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – VIII

Subject Code	17CTS86	I.A. Marks	100
Number of Lecture Hours/Week	04		
Total Number of Lecture Hours	50	Exam. Hours	03
CREDITS – 01		Total Marks-100	

Student can choose any topic, of his/her choice, pertaining to Construction Technology and Management. Topic should be a relevant and currently researched one. Students are advised to refer articles published in current journals in the area of Construction Technology and Management for choosing their seminar topics. Student should review minimum of 8 to 10 research papers relevant to the topic chosen, in addition to standard textbooks, handbooks, etc. Students are required to prepare a seminar report, in the standard format and give presentation to the departmental seminar committee.

Evaluation Pattern:

Report Evaluation : 50 Marks (by Guide)

Presentation : 50 Marks.

Presentation to be evaluated by departmental seminar committee.

Departmental Seminar Committee : Head of the Department

:Guide

: One Subject expert from the department