ESTIMATION,COSTING AND CONTRACT MANAGEMENT B.E., VII Semester, Civil Engineering [As per Choice Based Credit System (CBCS) scheme]			
Subject code	21CV71	CIE	50
Number of lecture hours per week	04	SEE	50
Total number of lecture hours	42	Exam hours	03

CREDITS 03

Course objectives: This course will enable students to;

1. Understand the terms and specifications of Civil engineering works.
2. Estimate the quantities of works, develop the bill of quantities, and arrive at the Cost of the civil engineering Project
3. understand the estimate of Road and substructure.
4. Understand and apply the concept of Valuation for Properties
5. Understand, Apply, and Create the Tender and Contract document.

Modules	Teaching Hours
Module-1	
Quantity Estimation for Building; study of various drawing attached with estimates, important terms, units of measurements, Abstract, Types of estimates - Approximate, detailed, supplementary and revised, Specification for Civil Engineering Works: Objective of writing specifications essentials in specifications, general and detail specifications of different items of works in buildings	08Hour
Module-2	
Estimation of building -Short wall and long wall method - centre line method. Estimate of buildings such as residential buildings, Hostel buildings, School buildings, Commercial buildings, etc. and R.C.C structures including Slab, beam, column, footings, with bar bending schedule.	08Hour
Module-3	
Estimate of Manhole, Soak pit and Septic tanks. Quantity Estimation for Roads: Road estimation, earthwork fully in banking, cutting, partly cutting and partly Filling, Detailed estimate and cost analysis for roads.	08Hour
Module-4	
Analysis of Rates: Factors Affecting Cost of Civil Works , Concept of Direct Cost , Indirect Cost and Project Cost Rate analysis and preparation of bills, Data analysis of rates for various items of Works, Sub-structure components, Rate analysis for R.C.C. slabs, columns and beams. Valuation: Definitions of terms used in valuation process, Cost, Estimate, Value and its relationship, Capitalized value. Concept of supply and demand in respect to properties (land , building , facilities'), freehold and lease hold , Sinking fund, depreciation–methods of estimating depreciation, Outgoings, Process and methods of valuation : Rent fixation, valuation for mortgage, valuation of land.	10Hour
Module-5	
Contract Management-Tender and its Process: Invitation to tender, Prequalification, administrative approval & Technical sanction. Bid submission and Evaluation process. Features / elements of standard Tender document (source: PWD / CPWD / NHAI / NHEPC / NPC). Law of Contract as per Indian Contract act 1872 , Types of Contract, Contract	08Hour

Management-Post award :Basic understanding on definitions, Performance security, Mobilization and equipment advances, Secured Advance, Suspension of work, Time limit for completion, Liquidated damages and bonus, measurement and payment, Breach of contract, Escalation, settlement of account or final payment, claims, Delay's and Compensation.	

COURSE OUTCOME:

After studying this course, students will be able to:

CO1. Prepare different type of estimate based on project and requirement of general, detailed specifications/method statement for various civil engineering activities.

CO2. Interpret the construction drawings and prepare the quantity estimates of different types of buildings and arrive at the Cost of civil engineering Project and other common item of works/projects.

CO3. To apply mathematical principles to estimate the quantities for construction septic tank, soak pit, manhole, roadwork, earthen embankments, canals and steel trusses.

CO4. Generate a justifiable rate for a civil engineering work by analysing various cost involvement. Understand and apply the concept of Valuation for Properties

CO5. Apply and create the tender and contract documents

Question paper pattern:

1. The question paper will have 5 modules comprising of ten questions. Each full question carrying equal marks
2. 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.
3. The students shall answer five full questions, selecting one full question from each module.
4. 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 BOOK:

1. Datta B.N., "Estimating and costing", UBSPD Publishing House, New Delhi
2. B.S. Patil, " Civil Engineering Contracts and Estimates", Universities Press
3. M. Chakraborthi; "Estimation, Costing and Specifications", Laxmi Publications
4. MORTH Specification for Roads and Bridge Works – IRC New Delhi
5. H.S.Vishwanth., "Estimation and valuation", Sapna publications, Bangalore.

REFERENCE BOOK:

1. Kohli D.D and Kohli R.C, " Estimating and Costing",12 th Edition, S.Chand Publishers, 2014.
2. Vazirani V.N and Chandola S.P, " Estimating and costing", Khanna Publishers, 2015.
3. Rangwala, C. "Estimating, Costing and Valuation", Charotar Publishing House Pvt. Ltd., 2015.
4. Duncan Cartlidge ,"Quantity Surveyor's Pocket Book", Routledge Publishers, 2012.
5. Martin Brook, "Estimating and Tendering for Construction Work", A Butterworth-Heinemann publishers, 2008.
6. Robert L Peurifoy ,Garold D. Oberlender , " Estimating Construction Costs" – 5ed , Tata McGraw-Hill ,New Delhi
7. David Pratt , " Fundamentals of Construction Estimating" – 3ed ,
8. PWD Data Book ,CPWD Schedule of Rates (SoR). and NH SoR – Karnataka
9. FIDIC Contract forms
10. B.S. Ramaswamy " Contracts and their Management" 3ed , Lexis Nexis (a division of Reed Elsevier India Pvt Ltd)

Course Articulation Matrix / Course mapping:

Note: 1-Low, 2-Medium, 3-High

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12	PSO1	PSO2	PSO3
CO1	3	1	2	2	1						1	2	2	2	2
CO2	3	1	3	2	1						1	2	3	3	2
CO3	3	1	3	2	1					2	1	2	3	3	1
CO4	3	1	1		2	1		1		1	2	2	3	2	1
CO5	3	2	1		2	1		1		1	2	2	3	2	1

DESIGN OF RCC AND STEEL STRUCTURES
B.E., VII Semester, Civil Engineering
[As per Choice Based Credit System (CBCS) scheme]

Subject Code	21CV72	**CIE**	50
Number ofLecture Hours/Week	03	**SEE**	50
Total Number of lecture Hours	42	**Exam Hours**	03

CREDITS – 03

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

1. Provide basic knowledge in the areas of limit state method and concept of design of RC and Steel structures
2. Identify, formulate, and solve engineering problems in RC and SteelStructures
3. Give procedural knowledge to design a system, component or process as per needs and specifications of RC Structures like Retaining wall, Footing,, Portal Frames and Steel Structures like Roof Truss, Plate Girder and GantryGirder.

Modules	**Teaching Hours**
PART-A	
Footings: Design of slab-beam type combined footing. **Retaining Walls:** Design of cantilever Retaining wall and counter fort retaining wall. Design of **circular water tanks** resting on ground (Rigid and Flexible base) by limit state method	21 Hours
PART-B	
Gantry Girder: Design of gantry girder with all necessary checks. **Roof Truss:** Design of roof truss for different cases of loading, forces in members to given. **Plate Girder:** Design of welded plate girder with intermediate stiffener,bearing stiffener and necessary checks	21 Hours

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

1. Apply the design philosophy and principles by limit state method.
2. Analysis and design of slab-beam type combined footing
3. To get knowledge in designs of RCC structural elements such as retaining walls.
4. Apply the conceptual designs of RCC structural elements such as circular water tanks by working stress method.
5. Apply the conceptual designs of steel truss and girders

Question paper pattern:

- Five questions shall be asked fromPart-A, and three questions from Part-B
- One full question should be answered from eachpart.
- Each question carries 50marks.
- Code books – IS 456, IS 800, IS 3370 (Part IV), SP-16, SP (6) – Steel Tables, shall be referredfordesigning. The same will be provided during examination.

REFERENCE BOOKS:

1. NKrishnaRaju,**"StructuralDesignandDrawingofReinforcedConcreteandSteel"**,UniversityPress
2. Subramanian N, **"Design of Steel Structures"**, Oxford university Press, NewDelhi.
3. K S Duggal, **"Design of Steel Structures"**, Tata McGraw Hill, NewDelhi

Course Articulation Matrix / Course mapping :

Note: 1-Low, 2-Medium, 3-High

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12	PSO1	PSO2	PSO3
CO1	3	2	3	2					1			1	1	3	2
CO2	3	2	3	2					1			1	2	3	2
CO3	3	2	3	2					1			1	1	3	2
CO4	3	2	3	2					1			1	1	3	2
CO5	3	2	3	2					1			1	1	3	2

RAILWAY,HARBOUR,TUNNEL AND AIRPORT [As per Choice Based Credit System (CBCS) scheme] VII - SEMESTER			
Course Code:	21CV73	**CIE**	50
NumberofLectureHour/Week	4	**SEE**	50
Total Number of Lecture Hours	42	**Exam Hours**	03
CREDITS –03			

Course Objectives: This course will enable students to

1.Understand the history and development, role of railways, railway planning and development based on essential

2.Learn different types of structural components, engineering properties of the materials,to calculate the material quantities required for construction

3. Understand various aspects of geometrical elements, points and crossings, significance of maintenance of tracks.

4. Design and plan airport layout, design facilities required for runway, taxiway and impart knowledge about visual aids

5. Apply design features of tunnels, harbors, dock and necessary navigational aids; also expose them to various methods of tunneling and tunnel accessories.

Modules	**Teaching Hours**
Module -1	
RAILWAY PLANNING :Significance of Road, Rail, Air and Water transports - Coordination of all modes to achieve sustainability - Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, - Track Stress, coning of wheels, creep in rails, defects in rails – Route alignment surveys, conventional and modern methods- - Soil suitability analysis - Geometric design of railways, gradient, super elevation, widening of gauge on curves- Points and Crossings	08 hours
Module -2	
RAILWAY CONSTRUCTION AND MAINTENANCE: Earthwork – Stabilization of track on poor soil –Calculation of Materials required for track laying - Construction and maintenance of tracks –Modern methods of construction & maintenance - Railway stations and yards and passenger amenities- Urban rail – Infrastructure for Metro, Mono and underground railways	09 Hours
Module -3	
AIRPORT PLANNING : Air transport characteristics-airport classification-airport planning: objectives, components, layout characteristics, socio-economic characteristics of the Catchment area, criteria for airport site selection and ICAO stipulations, Typical airport layouts, Case studies, Parking and circulation area.	08 Hours
Module -4	

AIRPORT DESIGN: Runway Design: Orientation, Wind Rose Diagram - Runway length - Problems on basic and Actual Length, Geometric design of runways, Configuration and Pavement Design Principles – Elements of Taxiway Design – Airport Zones – Passenger Facilities and Services – Runway and Taxiway Markings and lighting.	08 Hours
Module -5	
HARBOUR ENGINEERING Definition of Basic Terms: Harbor, Port, Satellite Port, Docks, Waves and Tides – Planning and Design of Harbours: Requirements, Classification, Location and Design Principles – Harbour Layout and Terminal Facilities – Coastal Structures: Piers, Break waters, Wharves, Jetties, Quays, Spring Fenders, Dolphins and Floating Landing Stage – Inland Water Transport – Wave action on Coastal Structures and Coastal Protection Works. Tunneling: Introduction, size and shape of the tunnel, tunneling methods in soils, tunnel lining, tunnel drainage and ventilation.	09 Hours

Course Outcomes: After studying this course, students will be able to:

CO#	Course Outcomes
CO1	Acquires capability of choosing alignment and also design geometric aspects of railway system, runway and taxiway.
CO2	Suggest and estimate the material quantity required for laying a railway track and also will be able to determine the hauling capacity of a locomotive.
CO3	Develop layout plan of airport and will be able relate the gained knowledge to identify required type of visual and/or navigational aids for the same.
CO4	Student can do design of an airport
CO5	harbour design and Apply the knowledge gained to conduct surveying, understand the tunneling activities

Question Paper Pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Text Books:

1. Saxena Subhash C and Satyapal Arora, "A Course in Railway Engineering", Dhanpat Rai and Sons, Delhi, 2003
2. Satish Chandra and Agarwal M.M, "Railway Engineering", 2nd Edition, Oxford University Press, New Delhi, 2013.
3. Khanna S K, Arora M G and Jain S S, "Airport Planning and Design", Nemchand and Brothers, Roorkee, 2012.
4. Bindra S P, "A Course in Docks and Harbour Engineering", Dhanpat Rai and Sons, New Delhi, 2013

Reference Books:

1. Rangwala, "Railway Engineering", Charotar Publishing House, 2013.
2. Rangwala, "Airport Engineering", Charotar Publishing House, 2013.
3. Rangwala, "Harbor Engineering", Charotar Publishing House, 2013.
4. P.PurushothamaRaj"Laxmi Publications2017
5. Oza.H.P. and Oza.G.H., "A course in Docks &Harbour Engineering". Charotar Publishing Co., 2013
6. Mundrey J.S. "A course in Railway Track Engineering". Tata McGraw Hill, 2007. 7. Srinivasan R. Harbour, "Dock and Tunnel Engineering", 26th Edition 2013

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note: 1-Low, 2-Medium, 3-High

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12	PSO1	PSO2	PSO3
CO1	2	2	3	-	-	-	-	-	-	-	2	2	-	-	-
CO2	-	-	-	-	-	-	3	-	3	2	-	-	-	-	-
CO3	-	-	3	-	-	2	-	-	-	-	-	-	-	-	-
CO4	3	3	3	1	-	-	2	-	2	-	-	-	-	-	-
CO5	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-

MUNICIPAL AND INDUSTRIAL WASTE WATER ENGINEERING

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

SEMESTER VII

Course Code	21CV741	**CIE**	50
NumberofLectureHour/Week	03L+0T	**SEE**	50
Total Number of Lecture Hours	42	**Exam Hours**	03

CREDITS –03

Course Learning Objectives: This course will enable students to;

1. Understand the various water demands and population forecasting methods.
2. Understandanddesigndifferentunitoperationsandunitprocessininvolvedinwastewatertreatment process
3. Understand the concept and design of various physicochemical treatment units
4. Understand the concept and design of various biological treatment units
5. Understandtheconceptofvariousadvancewastewaterandlowcosttreatmentprocessesforruralareas.

Modules	Teaching Hours
Module -1 **Introduction**, need for sanitation, methods of sewage disposal, types of sewerage systems, dry weather flow, wet weather flow, factors effecting dry and wet weather flow on design of sewerage system, estimation of storm flow, time of concentration flow, material of sewers, shape of sewers, laying and testing of sewers, ventilation of sewers. lowcost waste treatment; oxidation pond, septic tank, Sewer appurtenances, manholes, catch basins, basic principles of house drainage, typical layout plan showing house drainage connections.	8Hours
Module -2 **Design of sewers**, hydraulic formula for velocity, effects of variation on velocity, regime velocity, design of hydraulic elements for circular sewers for full flow and partial flow conditions, disposal of effluents by dilution, self purification phenomenon, oxygen sag curve, zones of purification, sewage farming, sewage sickness	8Hours
Module -3 **Waste water characteristics**, sampling and method of sampling, physical, chemical and biological characteristics, flow diagram for municipal waste water treatment, unit operations; screens, grit chambers, skimming tanks, equalization tanks Suspended growth and fixed film bio process, design of trickling filters, activated sludge process, sequential batch reactors, moving bed bio reactors, sludge digesters.	8Hours
Module -4 **Difference between domestic and industrial waste water**, effect of effluent discharge on streams, methods of industrial waste water treatment; volume reduction, strength reduction, neutralization, equalisation and proportioning. Removal of organic, inorganic and colloidal solids, combined treatment methods; merits, demerits and feasibility, principles of discharge of raw, partially treated and completely treated wastes in to streams	9Hours

Module -5	9Hours
Process flow chart, sources and characteristics of industrial waste water, treatment methods, reuse and recovery and disposal; cotton and textile industry, tanning industry, cane sugar and distilleries, dairyindustry, steel and cement industry, paper and pulp industry, pharmaceutical and food processing industry.	

Course Outcomes: After studying this course, students will be able to:

CO#	Course Outcomes
CO1	Select the appropriate sewer appurtenances and materials in sewer network.
CO2	Design the sewers network and underst and the self purification process inflowing water.
CO3	Design the various physic- chemical treatment units.
CO4	Design the various biological treatment units.
CO5	To analyze industrial Effluent standards & Treatment process

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Text Books:

1. Howard S. Peavy, Donald R. Rowe, George T, "Environmental Engineering" - Tata McGraw Hill, New York, Indian Edition, 2013
2. B C Punmia, "Environmental Engineering vol-II", Laxmi Publications 2nd, 2016
3. Karia G.L., and Christian R.A, "Wastewater Treatment Concepts and Design Approach", Prentice Hall of India Pvt. Ltd., New Delhi. 3rd, Edition, 2017
4. S.K.Garg, "Environmental Engineering vol-II, Water supply Engineering", Khanna Publishers, – New Delhi, 28th edition and 2017
5. Municipal & Industrial Waste Water Engineering 7th Sem Be Civil Engineering by Hs Vishwanath (Author), Sapna Book

Patwardhan A.D, "Industrial Waste Water Treatment", PHI Learning Private LimitedNew Delhi

Reference Books:

1. CPHEEO manual on sewage treatment, Ministry of Urban Development, Government of India, New Delhi,1999
2. Mark.J Hammer, "Water& Waste Water Technology" John Wiley & Sons Inc., New York, 2008
3. Benefield R.D., and Randal C.W, "Biological Process Design for Wastewater Treatment", Prentice Hall, Englewood Chiffs, New Jersey 2012

Metcalf and Eddy Inc, "Wastewater Engineering - Treatment and Reuse", Publishing Co. Ltd., New Delhi, 4th Edition, 2009..

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note: 1-Low, 2-Medium, 3-High

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12	PSO1	PSO2	PSO3

CO1		2	3			2					2			3	
CO2	2		3			3	2							2	
CO3	2		3									2	2	2	
CO4	2	2	2			2	2						2		
CO5	3	2	3			3	2							2	

PAVEMENT DESIGN B.E., VII Semester, Civil Engineering [As per Choice Based Credit System (CBCS) scheme]			
Subject code	21CV742	CIE	50
Number of lecture hours per week	04	SEE	50
Total number of lecture hours	42	Exam hours	03

CREDITS 03

Course Learning Objectives: This course will enable students to

1. Understand the factors affecting pavement design and performance
2. Evaluate the strength of soil subgrade soil and factors that affect the behavior of soil.
3. Compute the stresses and deflections in flexible pavement layers under the action of wheel loads.
4. Design the thickness of flexible pavements by different methods under different exposure conditions and materials.
5. Design the thickness of concrete pavements and joints associated with CC pavements in addition to the computation of stresses in CC pavements.

Modules	Teaching Hours
Module -1	
Road Pavements and pavement layers - types, functions, choice Factors affecting design and performance of flexible and rigid pavements – Pavement design factors, loads – axle load distribution, ESWL, EWL, VDF due to varying loads and CSA.	08Hour
Module -2	
Subgrade support - CBR and plate bearing tests, Resilient Modulus, fatigue tests, permanent deformation Pavement material Characteristics, climatic, drainage and environmental factors, their effects and evaluation. Factors affecting design and performance of airport pavements.	08Hour
Module -3	
Stresses and Deflection / strain in flexible pavements: Application of elastic theory, stresses, deflections / strains in single, two and three layer system, Applications in pavement design. Problems	08Hour
Module -4	
Flexible pavement design: Emperical, semi- empirical and theoretical design approaches, principle, advantages and application. Design steps by CBR method as per IRC, outline of other common design methods such as AASHTO and Asphalt Institute methods, Problems.	08Hour
Module -5	
Rigid pavement design: Determination of ESWL, EWL for dual and dual tandem wheel loads in Rigid pavements, General design principle, Stresses in rigid pavements, stresses due to wheel loads and temperature variations, design of cement concrete pavements (joints and slab thickness) as per IRC guidelines. Design features of CRCP, SFRC and ICBP, Problems.	10Hour

Course Outcomes: After studying this course, students will be able to:

CO1: Get the knowledge of factors affecting pavement design and performance
CO2: Evaluate the strength of soil subgrade soil and identify the factors that affect the behavior of soil.
CO3: Compute the stresses and deflections in flexible pavement layers under the action of wheel loads.
CO4: Design the thickness of flexible pavements by different methods under different exposure conditions and materials.
CO5: Design the thickness of concrete pavements and joints associated with CC pavements in addition to the computation of stresses in CC pavements.

Question paper pattern:

1. The question paper will have ten full questions carrying equal marks.
2. Each full question will be for 20 marks.
3. There will be two full questions (with a maximum of four sub- questions) from each module.
4. Each full question will have sub- question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module.

Textbooks:

1. Yoder and Witczak, "Principles of Pavement Design"- John Wiley and sons Inc(second edition) 1975
2. Yang, "Design of functional pavements"- Mc Graw Hill Book Co.
3. Huang, "Pavement Analysis"- Elsevier Publications
4. David Croney, Paul Croney, "Design & Performance of Road Pavements"- Mc Graw hill Book Co.
5. W.Ronald Hudson, Ralph Haas and Zeniswki "Modern Pavement Management"- Mc Graw Hill and Co
6. IRC 37-2001, IRC 81-1997, IRC 58 – 2002, IRC 59 – 1976, IRC 101-1988, Indian Roads Congress
7. Khanna and Justo "Highway Engineering"- Nemchand& Bros, Roorkee

Reference Books:

1. Yoder &witczak, "Principles of pavement design", John Wiley & Sons.
2. Subha Rao, "Principles of Pavement Design".
3. R Srinivasa Kumar, "Pavement Design" , University Press. 4. Relevant recent IRC codes
4. "Design and Analysis of Flexible Pavement" by Yasir Husain
5. "Pavement Design and Materials" by A T Papagiannakis and E AMasad

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):
Note: 1-Low, 2-Medium, 3-High

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12	PSO1	PSO2	PSO3
CO1	1	1			1	1							2	2	1
CO2		1			1	1							2	2	1
CO3		1			1	1							2	2	2
CO4		1			1	1							2	3	2
CO5		1			1	1							2	3	2

GREEN BUILDING B.E., VII Semester, Civil Engineering [As per Choice Based Credit System (CBCS) scheme]			
Subject code	21CV751	CIE	50
Number of lecture hours per week	04	SEE	50
Total number of lecture hours	52 hours	Exam hours	03

CREDITS 04

Course Learning Objectives: This course will enable students to

1.Understand the Definition, Concept & Objectives of the terms cost effective construction and green building.

2. Apply cost effective techniques in construction.

3. Apply cost effective Technologies and Methods in Construction.

4. Understand the Problems due to Global Warming.

5. State the Concept of Green Building.

Modules	Teaching Hours
Module -1 **Introduction to the concept of cost effective construction** -Uses of different types of materials and their availability -Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- Lime Poszolana Cement- Gypsum Board- Light Weight Beams- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo- Availability of different materials- Recycling of building materials–Brick-Concrete-Steel-Plastics-Environmental issues related to Quarrying of building materials..	10 Hours
Module -2 **Environment friendly and cost effective Building Technologies** - Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro Cement and Ferro Concrete constructions – different pre cast members using these materials - Wall and Roof Panels – Beams – columns - Door and Window frames - Water tanks - Septic Tanks - Alternate roofing systems - Filler Slab - Composite Beam and Panel Roof -Pre-engineered and ready to use building elements - wood products - steel and plastic - Contributions of agencies – Cost ford - Nirmithi Kendra - Habitat	10 Hours
Module -3 **Global Warming** – Definition - Causes and Effects - Contribution of Buildings towards Global Warming - Carbon Footprint – Global Efforts to reduce carbon Emissions Green Buildings – Definition - Features- Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in Materials Green Materials-Comparison of Initial cost of Green V/s Conventional Building-Lifecycle cost of Buildings.	10 Hours

Module -4 Green Building rating Systems- BREEAM – LEED - GREEN STAR -GRIHA (Green Rating for Integrated Habitat Assessment) for new buildings – Purpose - Key highlights - Point System with Differential weight age. Green Design – Definition - Principles of sustainable development in Building Design-Characteristics of Sustainable Buildings– Sustainably managed Materials- Integrated Life cycled sign of Materials and Structures (Concepts only).	10 Hours
Module -5 **Utility of Solar Energy in Buildings** Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings. **Green Composites for Buildings:** Concepts of Green Composites. Water Utilization in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage. Urban Environment and Green Buildings. Green Cover and Built Environment.	12 Hours

Course Outcomes: After studying this course, students will be able to:

1. Select different building materials for construction
2. Apply effective environmental friendly building technology l.
3. Analyze global warming due to different materials in construction.
4. Analyse buildings for green rating.
5. Use alternate source of energy and effective use water

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Textbooks:

1.HarharaIyer G, Green Building Fundamentals, Notion Press
2.Dr. Adv. HarshulSavla, Green Building: Principles & Practices

Reference Books: Green home Building by miki cook and douggarrett.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- **Students have to visit a building which is green rated and prepare a report**

COs and POs Mapping (Individual teacher has to fill up)

COs	POs														
	1	2	3	4	5	6	7	8	9	10	11	12	POS1	POS2	POS3
CO1	2	1				1	1						2		
CO2	2	1				1	1						1	1	
CO3	2	1				1	1						1		
CO4	2	1				1	1						1		
CO5	2	1				1	1						2		

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped
Note: Depending on the assessment tool used, higher order POs can be identified by the concerned course instructor

Intelligent Transport System

B.E., VII Semester, Civil Engineering

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

Subject code	21CV752	CIE	50
Number of lecture hours per week	3L+1T	SEE	50
Total number of lecture hours	52hours	Exam hours	03

CREDITS 04

Courseobjectives:

Thiscoursewillenablestudents

- TolearnthefundamentalsofITS.
- Tostudythe ITSfunctionalareas
- Tohaveanoverviewof ITSimplementationindevelopingcountries

Modules	**Teaching Hours**
Module -1	
IntroductiontoIntelligentTransportSystem:(ITS)-Definition–RoleandResponsibilities–AdvancedTravellerInformationSystem–FleetOrientedITSServices–ElectronicTollCollection–Criticalissues–Security–Safety	10Hour
Module -2	
ITSArchitectureandHardware:Architecture–ITSArchitectureFramework–HardwareSensors–VehicleDetection–Techniques–DynamicMessageSign –GPRS –GPS–TollCollection	10Hour
Module -3	
AdvancedTransportManagementSystem:VideoDetection–VirtualLoop-Cameras-ANPR–IRLighting–IntegratedTrafficManagement – Control Centre – Junction Management Strategies- ATMS – Advanced TravelerInformationSystems(ATIS)-RouteGuidance–Issues-Historical–Current–PredictiveGuidance–DataCollection–Analysis–DynamicTrafficAssignment(DTA)–Components	12Hour
Module -4	
AdvancedTravellerandInformationSystem:TravelInformation–Pre-TripandEnrouteMethods-BasicATISConcepts –SmartRouteSystem–DataCollection–Process–DisseminationtoTravelers–EvaluationofInformation–ValueofInformation–BusinessOpportunities	10Hour
Module -5	
AutomatedHighwaySystems-VehiclesinPlatoons–IntegrationofAutomatedHighway Systems.ITSProgramsintheWorld–OverviewofITSimplementationsindevelopedcountries, ITSindevelopingcountries	10Hour

Courseoutcome(CourseSkillSet)

Oncompletionofthecoursethestudentsshouldbeableto

CO#	Course Outcomes

CO1	Explain ITS & ATIS
CO2	Understandthesensorandcommunicationtechnologies
CO3	Explain about Advanced Transportation Management System
CO4	ApplythevariousITSmethodologies
CO5	DefinethesignificanceofITSunderIndianconditions

Course Articulation Matrix / Course mapping :

Note: 1-Low, 2-Medium, 3-High

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12	PSO1	PSO2	PSO3
CO1	1	2	1	1		1	2	1	2	1	1		1	2	1
CO2	2	2	1	1	1	1	2	1	2	1	1		1	1	1
CO3	2	2	1	1	1	1	2	1	1	1	1				
CO4	1	1	1	1		2	2	2	2	1	1		1	1	1
CO5	1	2	1	1		2	2	2	2	1	1		2	1	2

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

3D Modeling Software Lab

B.E., VII Semester, Civil Engineering

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

Subject code	21CVL76	CIE	50
Number of lecture hours per week	02	SEE	50
Total number of lecture hours	28	Exam hours	03

CREDITS 01

Course Learning Objectives: This course will enable students to

1. Be aware of the Scale Factors, Sections ofdrawings, Draft the detailing of RC and Steel Structuralmember.

CO#	Course Outcomes
CO1	To achieve skill sets to prepare computer aided Engineering drawings
CO2	Understand the details of construction of different concrete structure elements.
CO3	Visualize the completed form of the steel buildings and the intricacies of construction based on the engineering
CO4	After studying this course, students will be able Prepare detailed workingdrawings.
CO5	Understand the details of construction of different steel structure elements.

Experiments	Teaching Hours
Module-1	
Introduction To Sketch UP Pro: Importance of Sketch UP Pro for Architecture Students, Getting to Know the Interface, Interface basics, Adding toolbars, Navigating, Changing perspective,, Shading faces and edges, Setting preferences. **Manipulating Objects:** Selecting and moving objects, Scaling and rotating objects, Manipulating faces and edges, Advanced selection tools. **Drawing:** Line tool fundamentals, Refining objects with the Line tool, Using the Rectangle tool, Pushing and pulling faces into 3D, Creating circles and polygons, Creating ares, Using the Offset tool to create outlines, Creating 3D text**.** **Measuring and Labeling:** Using the Tape Measure tool, Creating text labels, using the Dimension tool, Creating sections**.**	6Hour
Module-2	
Organizing Scenes: Grouping objects, Working with layers, Creating layers, Using the Outliner, Hiding and un hiding objects, Locking and unlocking objects. **Creating Textures and Materials:** Using the Materials Browser on a Mac, Applying materials, Editing materials, Creating materials, Adjusting materials, Applying bitmap images, Mapping curved objects, Projecting maps on curved objects Importing floor plans, Modeling with floor plans, Rendering**..**	5Hour

Module-3	
Introduction To Revit: Importance of Revit, Using Basic Building Components I, Using the Editing Tools, Datum Planes and Creating Standard Views - Working with Reference Planes, Working with Levels, Working with Grids, Working with Project Views Using Basic Building Components II-Creating Floors -Creating Roofs- Shape Editing Tools - Creating Ceilings - Adding Rooms Using Basic Building Components III-Working with Components, Adding Stairs, Adding Railings and Ramps, Creating Curtain Walls	5Hour
Module-4	
Annotations and Dimensions-Adding Tags, Keynotes Creating Project Details and Schedules: Project Detailing, Adding Text Notes, Working with Schedules Creating Drawing Sheets and Plotting: Creating Drawing Sheets, Creating Duplicate Dependent Views	6Hour
Module-5	
Creating 2D drawing: Working on plans, elevation and sections with Revit. **Creating 3D Views**-Three Dimensional Views Rendering: Working with Materials, and Rendering**.**	6Hour
With the successful completion of the course student should have capability to: 1.Apply basic Sketch UP Concepts to 2D Geometry sha Reply 2.Draw Walls, Doors, Windows, Stairs using Sketch UP Software. 3.Apply 3D Modeling to convert 2D drawings into 3D Model using Sketch UP software. 4. Apply baste Revit Concepts Building Components And 5.Draw Roofs Ceilings Stairs Ramps using Revit software	

Course Articulation Matrix / Course mapping :

Note: 1-Low, 2-Medium, 3-High

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12	PSO1	PSO2	PSO3
CO1	3	3	2	1					1			1	3	2	3
CO2	3	3	3	1	1				1			1	3	2	3
CO3	3	3	3	2	1				1			1	3	2	3
CO4	3	2	3	2					1			1	3	2	3
CO5	3	2	3	1					1			2	3	1	3

CIVILWORKSHOP LAB

B.E., VII Semester, Civil Engineering [As per Choice Based Credit System (CBCS) scheme]			
Course Code	21CVL77	CIE	50
Number of lecture hours per week	02	SEE	50
Total number of lecture hours	28	Exam hours	03

CREDITS 01

Course Learning Objectives: This course will enable students,

1. Understand the basic practical knowledge about the construction site.
2. Understand the various materials required for different construction activities.
3. Demonstration of various plumbing works and different joint in doors , windows & truss.

To observe the different weldings.

	EXPERIMENTS	**Teaching Hours**
	Civil Engineering Activities At Construction Site : Visit anearbysitewhereconstructionisatinitialstageand observe for following (if necessary visit two/threetimes with a gap of a week). If drawings are availablerelate/matchactivitieswiththe drawings. (a) Diggingandfilling (b) Foundationpreparations (c) Brick/stonemasonry (d) ConcretelayingandCuring (e) Layingofsewerage/sanitarylines (f) Barbending. (g) Onsite Material testingforquality check. (h) Onsitepreparationforconstructionwork (i) Erectionandremovalofformwork,scaffolding,centering/shuttering Prepareabriefreportonconstructionactivities observedandmethods,tools,equipmentandmaterialsbeingused.	5Hour
	Visita nearby site where construction is at advance stageand observe for following (if necessary visit two/threetimeswithagapofaweek): (a) Plumbing (b) Welding,fittings, (c) Plastering (d) Flooring (e) POPwork Prepareabriefreportonconstructionactivities observedandmaterial,tools,equipmentandmethodsbeingused.	5Hour
	Visit a nearby site where construction work is at finishingstageandobserveforfollowing(ifnecessaryvisittwo/threetimeswi	5Hour

	thagapofaweek): (a) Carpentrywork (b) Falseceilingandaluminum–glassworks (c) Whitewashing/paintingwork(surfacepreparationbeingcarriedoutfortimber/steel/plasteredsurface.) Prepare a brief report on construction activities observedandmaterial,tools,equipmentandmethodsbeingused.	
	Marklevelofgivenheightfromgroundlevelatdifferentlocationsintheworkshopusingwaterpipetechnique. Prepareaplainsmoothblock(cuboid)oftimberofgivendimensionusingsawinganddplanningoperations. Jointwowoodenblockswiththehelpofdovetailjoint.(Usingsawingandchiseling operations) Drilltheholeofgivendimensionatgivenlocationona metal/woodpiece. ObservedemonstrationofArcweldingandGasCuttingof metalplates.	5Hour
	PLUMBING Assemble a pipe line as per given drawing using pipes ofone inch diameter, pipes of half inch diameter, nipple,reducer, union, T, elbow, tap etc. (This may involve basictasks such as marking, cutting, threading, etc anduse ofappropriate techniquesso thatwaterleakagedoesnotoccur)andthendissemblethispipeline.	4Hour
	MODELING DIFFERENT CIVIL ENGINEERING STRUCTURES Such as types of Dams, types of Bridges, Multi Storey Building, towers, OHT, educational Building, Hospitals, Commercial Building, Warehouse,	4Hour

CO#	Course Outcomes
CO1	To develop basic technical knowledge of construction activities.
CO2	Apply basic techniques for masonry and concrete related works.
CO3	Identifying appropriate material required for each activity.
CO4	To observe technical aspects involved in workmanship of various plumbing tasks.
CO5	To observe technical aspects involved in safety precausions.

Course Articulation Matrix / Course mapping :

Note: 1-Low, 2-Medium, 3-High

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12	PSO1	PSO2	PSO3
CO1	3	2	3			2	3	1	2	2		2	1	2	
CO2	3	2	3			2	3	1	2	2		2	1	2	
CO3	3	2	3			2	3	1	2	2		2	1	2	
CO4	3	2	3			2	3	1	2	2		2	1	2	
CO5	3	2	3			2	3	1	2	2		2	1	2	

COMPUTER AIDED DETAILING OF STRUCTURE LAB

B.E., VII Semester, Civil Engineering

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

Subject code	21CVL78	CIE	50
Number of lecture hours per week	02	SEE	50
Total number of lecture hours	28	Exam hours	03

CREDITS 01

Course Learning Objectives: This course will enable students to

2. Be aware of the Scale Factors, Sections ofdrawings, Draft the detailing of RC and Steel Structuralmember.

CO#	Course Outcomes
CO1	To achieve skill sets to prepare computer aided Engineering drawings
CO2	Understand the details of construction of different concrete structure elements.
CO3	Visualize the completed form of the steel buildings and the intricacies of construction based on the engineering
CO4	After studying this course, students will be able Prepare detailed workingdrawings.
CO5	Understand the details of construction of different steel structure elements.

Experiments	Teaching Hours
Module-1	
Detailing of RCC Structures ▪ Beams – Simply supported, Cantilever andContinuous. ▪ Slab – One way, Two way and One-waycontinuous. ▪ Combined footing ▪ Cantilever Retainingwall ▪ Counter Fort Retainingwall	14 Hour
Module-2	
Detailing of Steel Structures 1. Connections–Beamtobeam,BeamtoColumnbyBoltedandWeldedConnections. 2. Built-up Columns with lacings andbattens 3. Column bases and Gusseted bases with bolted and weldedconnections. 4. Roof Truss – Welded andBolted 5. GantryGirder	14 Hour

Question paper pattern:

1. Two questions shall be asked from eachModule.
2. One full question should be answered from eachModule.

Each question carries 50marks.

Textbooks:

1. NKrishnaRaju,"StructuralDesignandDrawingofReinforcedConcreteandSteel",UniversityPress
2. KrishnaMurthy,"StructuralDesignandDrawing–ConcreteStructures",CBSPublishers,NewDelhi

Reference Books:

1. SP 34: Handbook on Concrete Reinforcement and Detailing, Bureau of IndianStandards.
2. IS 13920, Ductile Design And Detailing Of Reinforced Concrete Structures Subjected To Seismic Forces - Code Of Practice, Bureau of IndianStandard.

Course Articulation Matrix / Course mapping :

Note: 1-Low, 2-Medium, 3-High

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12	PSO1	PSO2	PSO3
CO1	3	3	2	1					1			1	3	2	3
CO2	3	3	3	1	1				1			1	3	2	3
CO3	3	3	3	2	1				1			1	3	2	3
CO4	3	2	3	2					1			1	3	2	3
CO5	3	2	3	1					1			2	3	1	3

PROJECT-VII

B.E., VII Semester, Civil Engineering

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

Subject Code	21PRJ79	CIE Marks	50
Number Lecture Hour/Week	2P	SEE Marks	50
Total Number of Lecture Hours	24	Exam Hours	03
CREDITS-01			

Course Objectives: Students will be taught to:

1. Get exposure about the civil engineering coursework to solve real-world problems.
2. Design the working model of the open ended problem.
3. Understand concepts of safety durability and environmental impacts.
4. Understand the latest technology and software tools.
5. Prepare technical documentation of the project.

STUDENTS WILL BE GIVEN A OPEN ENDED PROBLEM OF THE SOCIETY AND ASKED TO SOLVE BY DESIGNING AND IMPLEMENTING THE SYSTEM IN TEAM.

Course outcomes: After studying this course, students will be able to:

CO1. Apply the knowledge of civil engineering and to solve the real time problems of the society.
CO2. Analyze the various existing solutions available to solve the real time problem and propose the best solution.
CO3. Design and implement the system to solve the real time problem of the society.
CO4. Conduct investigations on the output and prepare the technical documentation of the designed system in a team.
CO5. Use the modern tool available like advanced software tools.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2
CO1	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**3**
CO2	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**3**
CO3	**-**	**-**	**3**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**3**
CO4	**-**	**-**	**-**	**3**	**-**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CO5	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**

INDUSTRIAL PSYCHOLOGY AND ORGANISATIONAL BEHAVIOUR

[As per NEP, Outcome Based Education (OBE) and Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	21HSM710	CIE Marks	50
Number of Lecture Hour/Week	01	SEE Marks	50
Total Number of Lecture Hours	20	am Hours	

CREDITS-01

Course Objectives: This course will enable students to:

1. Relating human psychology to science
2. Understand the human psychology
3. Understand the nature of organization and organization models
4. Understand the human social communication
5. Understand the leadership qualities

Modules	**Teaching Hours**
Module -1	
Introduction to I/O psychology: Major fields of I/O psychology, brief history of I/O psychology, employment of I/O psychology, ethics in I/O psychology. (Chapter-1)	3 Hours
Module -2	
Organisational communication: Types of organizational communication, interpersonal communication, improving employee communication skills. (Chapter-11)	3 Hours
Module -3	
Leadership : Introduction, personal characteristics associated with leadership, interaction between the leadership and the situation specific leader skills, leadership where we are today. (Chapter-12)	5 Hours
Module -4	
Group behaviour- teams and conflicts Group dynamics, factors affecting group performance, individual versus group performance, group conflicts. (Chapter-13)	5 Hours
Module-5	
Stress management: Dealing with the demands of life and work, stress defined, predisposition to stress, sources of stress, consequences of stress, stress reduction intervention related to life /work issues. (Chapter-15)	4 Hours

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

CO-1-Comprehend the knowledge and concepts of human psychology

CO-2-know the importance of communication in organization.

CO-3-have insight into individual, group behavior and leadership skills.

CO-4-deal with people in better way by knowing their behavior.

CO-5-Dealing with stressand work issues.

Text Book: MichaelG.Aamodt, Industrial/Organizational Psychology: An Applied Approach, 6th Edition, Wadsworth Cengage Learning, ISBN: 978-0-495-60106-7.

Reference Books:

1. Blum M.L. Naylor J.C., Horper& Row, Industrial Psychology, CBS Publisher, 1968
2. Luthans, Organizational Behaviour, McGraw Hill, International, 1997
3. Morgan C.t.,KingR.A.,JohnRweisz&JohnSchoples, Introduction to Psychology, McHraw Hill, 1966
4. SchermerhornJ.R.Jr., Hunt J.G &Osborn R.N., Managing, Organizational Behaviour, John Willy

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note:1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2
CO1	-	-	-	-	-	2	-	-	3	-	-	2	-	-
CO2	-	-	-	-	-	2	-	-	3	3	-	2	-	-
CO3	-	-	-	-	-	2	-	-	3	-	-	2	-	-
CO4	-	-	-	-	-	2	-	-	3	-	-	2	-	-
CO5	-	-	-	-	-	2	-	-	3	-	-	2	-	-