GOVERNMENT OF INDIA
MINISTRY OF
PARLIAMENTARY AFFAIRS

Azadi Ka Amrit Mahotsav

my GOV
मेरी सरकार

PREAMBLE TO THE CONSTITUTION

PREAMBLE

WE, THE PEOPLE OF INDIA,

having solemnly resolved to constitute India

into a SOVEREIGN SOCIALIST SECULAR DEMOCRATIC

REPUBLIC and to secure to all its citizens:

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity;

and to promote among them all

FRATERNITY assuring the dignity of the individual and

the unity and integrity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this 26th day of

November, 1949, do HEREBY ADOPT, ENACT AND GIVE

TO OURSELVES THIS CONSTITUTION.

I have read the Preamble

Signature

23-01-2022

No. SSAHE/ACA-S&C/16/UG(BE)/2024   Date: 15/07/2024

NOTIFICATION

Sub: - Ordinance pertaining to Curriculum of Undergraduate Programme Bachelor of Engineering (4th Year Civil Engineering)

Ref: Proceedings of the Academic Council meeting held on 10/07/2024 vide agenda No. SSAHE/AC/XXVIII-12/2024

In exercise of the powers vested under section 6 of 6.05 of MoA / Rules of SSAHE, the Revised Ordinance pertaining to Curriculum of Undergraduate Programme Bachelor of Engineering (4th Year Civil Engineering) is notified herewith as per Annexure.

By Order,

REGISTRAR

REGISTRAR
Sri Siddhartha Academy of Higher Education
TUMKUR - 572 107, Karnataka.

To,
Dean / Principal, Sri Siddhartha Institute of Technology,

Copy to
1) Office of the Chancellor, SSAHE, for kind information,
2) PA to Vice-Chancellor / PA to Registrar / Controller of Examinations / Finance Officer, SSAHE
3) All Officers of the Academy Examination Branch / Academic Section
4) Guard File / Office copy.

VII SEMESTER B.E.

VII Semester B.E. (Common to all UG programs) (Subjects and Syllabus as per AICTE-Model Curriculum for UG Course in Eng. & Tech.- 2020-21)						Examination				
SI No	*Course and Course Code*		*Course Title*	*Teaching dept.*	*Board of Exam.*	*Credits*	*CIE*	*SEE*	*Total Marks*	*Exam Hrs.*
01	PC	CE7TH1	**Design of Steel Structures**	**CE**	**CE**	**3**	**50**	**50**	**100**	**3**
02	PC	CE7TH2	**Quantity Surveying and Estimation**	**CE**	**CE**	**3**	**50**	**50**	**100**	**3**
03	PE	CE7PE3x	**Professional Elective-III**	**CE**	**CE**	**3**	**50**	**50**	**100**	**3**
04	PE	CE7PE4x	**Professional Elective-IV**	**CE**	**CE**	**3**	**50**	**50**	**100**	**3**
05	PE	CE7PE5x	**Professional Elective-V**	**CE**	**CE**	**3**				
06	PC	CE7LB1	**Environmental Engineering Lab**	**CE**	**CE**	**1.5**	**50**	**50**	**100**	**3**
07	PC	CE7LB2	**Internship**	**CE**	**CE**	**1.5**	**50**	**50**	**100**	**3**
08	PC	CE7PW1	**Project Phase-1**	**CE**	**CE**	**2**	**50**	**-**	**50**	**-**
	Total					**20**	**400**	**300**	**700**	**-**
CIE-Continuous Internal Evaluation, SEE-Semester End Examination										

Professional Elective III:	Professional Elective IV:	Professional Elective V:
CE7PE31: Pavement Design **CE7PE32: Earthquake Resistant Design of Structures** **CE7PE33: Solid Waste Management**	**CE7PE41: Design of Prestressed Concrete Structures** **CE7PE42: Environmental Engineering-II** **CE7PE43: Ground water hydrology**	**CE7PE51: Hydraulic structures & irrigation design** **CE7PE52: Adv. Design of RC Structures** **CE7PE53: Structural dynamics**

Department of Civil Engineering

Scheme & Syllabus 2020

Department: CIVIL ENGINEERING   **Semester: VII**

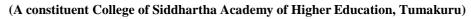**Subject Name: DESIGN OF STEEL STRUCTURES**

Subject Code: CE7TH1   **L-T-P-C: 3-0-0-3**

Course Objectives :

Sl.No	Course Objectives
1	To provide an exposure on basic concepts of Steel structure,IS steel code provisions, and plastic behavior of structural steel.
2	To understand the basics of Bolted connections and Welded connections
3	To learn the design of tension members and design of compression members
4	To learn the design of laterally supported and un-supported steel beams.

Note: Study of this course should be based on IS: 800-2007

UNIT	Description	Hours
I	**INTRODUCTION:** Advantages and Disadvantages of Steel structures, Loads and Load combinations, Design considerations, Limit State Method (LSM) of design, Codes, Specifications and section classification.(No Problems) Plastic Behavior of Structural Steel: Introduction, Plastic theory, Plastic hinge concept, Plastic collapse load, conditions of plastic analysis,	7
II	**BOLTED CONNECTIONS**: Introduction, Behavior of Bolted joints, Design strength of ordinary Black Bolts, Design strength of High Strength Friction Grip bolts (HSFG), Moment resistant eccentric connections, **WELDED CONNECTIONS**: Introduction, Welding process, Advantages of Welding, Types and Properties of Welds, Types of joints, Weld symbols, Weld specifications, Design of welds, Simple joints, Moment resistant eccentric connections, Continuous Beam to Beam connections, Beam Column splices.for both bolted and welded connection	8
III	**DESIGN OF TENSION MEMBERS:** Introduction, Types of tension members, Modes of failure, Factors affecting the strength of tension members, Angles and Other sections under tension, Design of tension member with Lug angles and Splices,	8

IV	**DESIGN OF COMPRESSION MEMBERS**: Introduction, Failure modes, Behaviour of compression members, Sections used for compression members, Effective length of compression members, Design of compression members	8
V	**DESIGN OF BEAMS:** Codal provisions, Lateral buckling, Web buckling and crippling, Analysis of laterally restrained and unrestrained beams.	8

Course Outcomes

Course outcome	Descriptions
CO1	Course gives an analysis on the basic concept of steel structure and plastic analysis
CO2	Course gives the details how to design steel structures using welded and bolted connections
CO3	Course gives information to design tension members,compression members using steel sections
CO4	Course gives information to design steel columns, beams

Course Articulation Matrix

CO \ PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	3	3	3	3	2		1
CO2	3	3	3	3	1	3	3	3	3	2		1
CO3	3	3	3	3	1	3	3	3	3	2		1
CO4	3	3	3	3	1	3	3	3	3	2		1

Text Books:

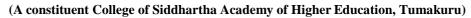| Sl No	Text Book title	Author	Volume and Year of Edition
1	Design of Steel Structures By Limit State Method	S. S. Bhavikatti	Second Edition, I K International Publishing House, India, 2010
2	Limit State Design of Steel Structures	S. K. Duggal,	Tata McGraw Hill Education Private Limited, New Delhi, India, 2015
3	Design of Steel Structures	N. Subramanyam	Oxford University Press, New Delhi, india, 2016. Third Edition

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Reference Book:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Design of steel structures	Dr N.Rama Chandra and Virendra Gehlot,	Scientific Publishers, india , 2009
2	Design of Steel Structures	Dr N.Ramachandra.	Vol 2 2018 standarad book house new Delhi
3	Design of Steel Structures	P. Dayarathnam	Prentice Hall India, New Delhi, india, edition 2,2011
4	IS800-2007, & Steel tables	Bureau of Indian Standards,	General Construction in Steel Code Practice 3rd edition

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Department: Civil Engineering   **Semester: VII**
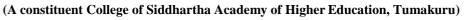
Subject Name: Quantity Surveying and Estimation

Subject Code: CE7TH2   **L-T-P-C: 3-0-0-3**

Course objectives :

Sl no	Course objectives
1	This course will enable students to learn to Estimate the quantities and cost of work
2	This course will enable students to learn about different rate analysis and develop the bill of quantities and arrive at the cost of civil engineering projects
3	This course will enable students to build the skill to prepare different types of estimates and approximate estimates and approximate estimation of Civil Engineering work.
4	This course will enable students to gain knowledge to place tender, how to maintain quality and administrative approval process for the contract called by government and private authorities.

UNIT	Description	Hours
I	**Estimation:** study of various drawings with estimates, important terms, units of measurements, abstract methods of taking out quantities and cost of center line method, long wall and short wall method. Preparation of detailed and abstract estimates for **One BHK** residential building.	15
II	**Estimates:** Manhole, Septic Tank & Soak Pit, RCC Box Culvert and Rectangular RCC Beam.	6
III	**Rate Analysis:** Definition and purpose, working out quantities and rates for the following standard items of work- CC 1:4:8 for floor, CC M-20 for RCC column, CC M-25 for RCC slab, First Class BBM in CM 1:6, Solid Block Masonry in CM 1:6 for 20cm/ 15cm thick wall, 2-layer WBM for Village Road, Plastering in CM 1:4 for 20mm thick, Vitrified Tiles for Flooring in CM 1:4, SSM in CM 1:8 for Foundation, Teak Wood Doors and Frames.	6
IV	**Measurement of Earthwork for Roads:** Methods for computation of earthwork sections, Mid section formula and mean sectional area method, trapezoidal & Prismoidal formula with and without cross slopes.	6

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V	**Approximate Estimation:** Different types of estimates, approximate methods of estimating buildings and cost of materials. **Short note on:** Types of contract, Tender, earnest Money deposit (EMD), Security Deposit (SD), Quality Control (QC), Administrative approval and Technical sanction, Nominal Muster Roll (NMR), Measurement Books (MB). Introduction to Karnataka transparency act in public procurements.	6

Course Outcomes

Course outcome	Descriptions
CO1	Student will be able to prepare detailed and abstract estimates for building, manhole, septic tank. RCC culvert.
CO2	Students are able to make estimates for earth work in embankment and cutting with or without lateral slopes.
CO3	Students are able to make rate analysis for civil engineering works.
CO4	Students are able to write short notes on terms in departmental procedure.

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	3	3	2	2	2	3	3
CO2	2		2	2	1	3	2	2		2	2	2
CO3	3	3	2	3	3		2	2			2	3
CO4	3	3	2	3	2		2	2	2	1	1	1

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Estimating & Costing,	B. N. Dutta	UBSPD Publishing House, New Delhi22 edition
2	Estimating & Specification	S.C. Rangwala	Charotar Publishing House Pvt. Ltd., 2015.

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Reference Book:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Estimating, costing, specification and valuation in Civil Engg	Chakraborti N	DhanpathRai and sons New Delhi. 2014
2	Contracts and Estimates	B. S. Patil	University Press, 2006.
3	Estimating and costing	Vazirani V.N and Chandola S.P,	Khanna Publishers, 2015

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Department: Civil Engineering   **Semester: VIII**

Subject Name: Pavement design

Subject Code: CE7PE31   **L-T-P-C: 3-0-0-3**

Course objectives :

Sl no	Course objectives
1	To enable the students learn the basics of pavements,differences between highway and airfield pavements
2	To understand about the design factors and the stresses in flexible and rigid pavement.
3	To design flexible and rigid pavements
4	To understand about maintenance and evaluation of flexible and rigid pavements.

UNIT	Description	Hours
I	**Introduction:** Desirable characteristics of pavement, types and components, comparison between Rigid and flexible pavement Difference between Highway pavement and Air field pavement with respect to loading characteristics. . **Fundamentals of Design of Pavements:** Design life, Traffic factors, climatic factors, Road geometry, etc., Boussinesq's theory principle, Assumptions Limitations and problems on above - Burmister theory, assumptions, limitations and problems on above.	08
II	**Design Factors:** Design wheel load, contact pressure, ESWL concept Determination of ESWL by equivalent deflection criteria Stress criteria EWL concept. **Flexible Pavement Design:** Assumptions McLeod Method Kansas method Tri-axial method - CSA Method using IRC 37-2001,CR-method of pavement design, problems on above.	10
III	**Stresses in Rigid Pavement:** Principle Factors-wheel load and its repetitions, properties of plain cement concrete. External conditions joints Reinforcement Analysis of stresses Assumptions Westergaard's Analysis Modified Westergaard's equations Critical stresses Wheel load stresses, Warping stress Frictional stress combined stresses - problems on above.	07

IV	**Design of Rigid Pavement**: Design of C.C. Pavement by IRC: 58 2001 Requirements of joints, Types of joints: Expansion joint, contraction joint, warping joint, construction joint, longitudinal joint. Design of joints, Design of Dowel bars, Design of Tie bars and problems on above	07
V	**Flexible pavement failures, maintenance and evaluation:** Types of failures, causes, remedial/maintenance measures in flexible pavements, Functional Evaluation by visual inspection and unevenness measurement by using different techniques - Structural Evaluation by Benkelman Beam Deflection Method. **Rigid Pavement Failures, Maintenance And Evaluation:** Types of failures, causes, remedial/maintenance measures in rigid pavements Functional Evaluation by visual inspection and unevenness measurements.	07

Course Outcomes

Course outcome	Descriptions
CO1	Student understands the desirable characteristics of pavements, its types, functions of various layer and fundamentals of design of pavements.
CO2	The student learn various pavement design factors, stresses in flexible pavements and their design methods.
CO3	Students able to learn about various types of stresses in rigid pavements and its determination, stresses in reinforcement.
CO4	Students able to learn about the design of rigid pavements, joints, dowel bars and tie bars and maintenance of flexible and rigid pavements.

Course Articulation Matrix

CO \ PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	2	2	3	2	1	2	1	1	2	1		1		
CO2	3	3	3	3	2	2	2	1	2	2	1	1	2	2
CO3	3	3	3	3	3	2	2	1	2	2	1	1		1
CO4	3	3	3	3	2	2	2	1	1	2	2	1		

Text Books:

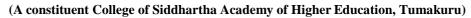| Sl No	Text Book title	Author	Volume and Year of Edition
1	Highway Engineering	Khanna,CEC Justo and Veeraraghavan	Nemchand& Bros
2	Principle and practice of Highway Engineering	L.R.Kadiyalli and N.B.Lal	Khanna publications

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Reference Book:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Principles, practice and design of Highway Engineering	S.k.Sharma	S.Chand Technical publications
2	Principles of Pavement Design	Yoder and Witzack	2nd edition, John Wileys and Sons
3	Relevant IRC codes		

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Department: Civil Engineering   **Semester: VII**

Subject Name: Earthquake Resistant Design of Structures

Subject Code: CE7PE32   **L-T-P-C: 3-0-0-3**

Course objectives:

Sl no	Description
1	To understand the fundamentals of engineering seismology and seismic performance of buildings.
2	Irregularities in building which are detrimental to its earthquake performance.
3	Different methods of computing the seismic lateral forces for framed and masonry structures.
4	The requirements of Earthquake resistant design for RCC and Masonry structures.

UNIT	Description	Hours
I	**Engineering Seismology:** Terminologies-Focus, Focal depth, Epicenter, Causes of Earthquakes; Elastic rebound theory and Theory of plate tectonics; Classification of Earthquakes; Types and characteristics of seismic waves; Magnitude and intensity of earthquakes, Earthquake ground motion characteristics: Amplitude, frequency and duration; Seismic zoning map of India.	7
II	**Seismic Performance of Buildings:** Structural configuration for earthquake resistant design, Overall Form, Simplicity, Uniformity, and Symmetry. Effect of Structural Irregularities on seismic performance of RC buildings. Vertical irregularity, plan irregularity, mass irregularity and stiffness irregularity. Architectural aspects of earthquake resistant buildings, Seismic-resistant building architecture, lateral load resistant systems and building characteristics.	7
III	**Design philosophy and Earthquake Effects on Structures:** Seismic design philosophy, Response spectrum-Definition, construction, Characteristics, Response to ground acceleration, torsional response of buildings. Procedure for seismic analysis of RC buildings using Equivalent static lateral force method as per IS 1893:2016. Numerical problems on above.	8
IV	**Seismic analysis and ductile detailing:** Reinforced Concrete Beams, Seismic Design of Ductile Reinforced Concrete column, Concept of weak beam-strong column, Detailing of Beam-Column Joints to enhance ductility, Ductile Detailing as per IS 13920:2016, Concept of soft and weak storey.	9

V	**Earthquake Resistant Design of Masonry Buildings:** Performance of Unreinforced, Infill Masonry Walls, Box Action, Lintel and sill Bands. Earthquake resistant design of masonry buildings-elastic properties of structural masonry, lateral load analysis of masonry buildings as per IS 13828:1993.	8

Course Outcomes:

Course outcome	Descriptions
CO1	Describe the theories responsible for occurrence of earthquakes and seismology.
CO2	Derive the elastic response spectra and design spectra in the design of earthquake resistant buildings.
CO3	Analyze the problems associated with structural configuration in the seismic performance of buildings.
CO4	Describe the need for ductile detailing of RC structures and masonry buildings.

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1		2	2	1	1	1		2
CO2	3	2	2	1	1	2		2	1	2	1	2
CO3	2	2	2	2	2	2	2	2	1	2	2	2
CO4	3	3	3	2	2	3	3	3	1	2	2	2

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	"Earthquake resistant design of structures", Prentice Hall of India, New Delhi.	Pankaj Agarwal and Manish Shrikande	5th Edition, 2008
2	"Earthquake Resistant Design of Structures", Oxford University Press.	S K Duggal	6th Edition, 2009

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Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	"Seismic Analysis of Structures", John Wiley & Sons.	T K Datta	3rd Edition, 2009
2	"Dynamics of Structures: Theory and Applications to Earthquake Engineering", John Wiley & Sons.	Anil K Chopra	3rd Edition, 2009
3	"Concepts in Earthquake Behaviour of Buildings", Pearson Education.	C V R Murty, Rupen Goswami, A R Vijayanarayanan & Vipul V Mehta	2nd Edition, 2005
4	"Earthquake resistant design and risk reduction", John Wiley & Sons.	David Dowrick	1st Edition, 2006

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Department: Civil Engineering   **Semester: VII**

Subject Name: Solid Waste Management

Subject Code: CE7PE33   **L-T-P-C: 3-0-0-3**

Course Objectives

Sl.No	Course Objective
1	Students will enable to know the classification and characterization
2	Students will know about the types of solid wastes, and its management through different methods of disposal
3	Analyze different processing technologies and to study conversion of municipal solid waste to compost or biogas.
4	Evaluate landfill site and to study the sanitary landfill reactions and management of bio medical, e waste and hazardous waste, recycle and reuse concepts

UNIT	Description	Hours
I	**Introduction:** Definition, Land Pollution scope and importance of solid waste management, functional elements of solid waste management. SOURCES: Classification and characteristics municipal, commercial & industrial. Methods of quantification. **Collection And Transportation:** Systems of collection, collection equipment, garbage chutes, transfer stations bailing and compacting, route optimization techniques and problems.	8
II	**Treatment / Processing Techniques:** Components separation, volume reduction, size reduction, chemical reduction and biological processing problems. **Incineration:** Process 3 T's, factors affecting incineration process, incinerators types, prevention of air pollution, pyrolsis, design criteria for incineration	8
III	**Composting:** Aerobic and anaerobic composting, factors affecting composting, Indore and Bangalore processes, mechanical and semi mechanical composting processes. Vermicomposting. **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	8
IV	**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	8

V	**Recycle and Reuse:** Material and energy recovery operations, reuse in other industries, plastic wastes, environmental significance and reuse	7

Course Outcomes

Course outcome	Descriptions
CO1	The students should know the importance of SWM and its guidelines
CO2	The knowledge of sources, collection and transport & process techniques of SWM
CO3	The knowledge in disposal of Bio medical waste, e waste, hazardous waste and composting methods
CO4	Ability to understand the importance of recycle and reuse and public responsibilities in SWM

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	0	0	0	3	2	2	2	2	2	3
CO2	2	2	0	1	0	3	2	2	2	2	1	1
CO3	2	2	0	1	1	3	2	2	2	2	2	1
CO4												

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Environmental Engineering	S.K. Garg	Vol II
2	Solid Waste Engineering	Vesilind.Pa Worrell & Reinhart.D	2009 .

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Integrated Solid Waste Management:	Tchobanoglous	McGraw Hill 1999
2	Solid Waste Management in developing countries	Bhide and Sunderashan	2000
3	Hand book on Solid Waste Disposal	Pavoni J.L	2008

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4	Environmental Engineering	Peavy and Tchobanoglous	2012

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Department: Civil Engineering   **Semester: VII**

Subject Name: Design of Prestressed Concrete Structures

Subject Code: CE7PE41   **L-T-P-C: 3-0-0-3**

Course Objectives

Sl.No	Course Objectives
1	This course will enable students to learn basic principles of prestressing elements.
2	To learn about losses and deflection of prestressed members
3	To learn design of prestressed concrete elements subjected to flexure and shear.
4	Enable students to learn design of end blocks.

UNIT	Description	Hours
I	**Materials** :High strength concrete & 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. **Analysis of Sections for Flexure**: Stresses in concrete due to pre-stress and loads, stresses in steel due to loads, Cable profiles	8
II	**Losses of Pre-stress:** Various losses encountered in pre-tensioning and post tensioning methods, determination of jacking force.	7
III	**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	8

IV	**Design of Section for** Flexure: IS Code recommendations Ultimate flexural strength of sections. **Design of Shear:** IS Code recommendations, shear resistance of sections, shear reinforcement. Limit state of serviceability control of deflections and cracking.	8
V	**Design of End Blocks:** Transmission of prestress in pretensioned members, transmission length, Anchorage stress in post-tensioned members. Bearing stress and bursting tensile force-stresses in end blocks- Methods, I.S. Code, provision for the design of end block reinforcement.	8

Course Outcomes

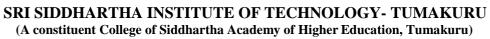| Course outcome	Descriptions
CO1	Students will be able to assess the requirements of PSC members.
CO2	To design PSC member after studying losses and deflection
CO3	To design PSC beam for flexure and shear
CO4	To design end blocks

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	3	3	3	3	2		1
CO2	3	3	3	3	1	3	3	3	3	2		1
CO3	3	3	3	3	1	3	3	3	3	2		1
CO4	3	3	3	3	1	3	3	3	3	2		1

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Pre-stressed Concrete	N. Krishna Raju	Tata McGraw Hill Publishing Company, New Delhi 2016
2	Design of pre-stressed concrete structures	T.Y. Lin and Ned H. Burns	John Wiley & Sons, New York.2015

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Reference Book:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Prestressed Concrete Structures	P. Dayarathnam	Oxford & IBH-Pubs Company, Delhi, 5th Edition
2	Pre - stressed Concrete	Pundit G S and Gupta S P	C B S Publishers, New Delhi 4th edition 2017
3	IS : 1343		Indian standard2012

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Department: Civil Engineering   **Semester: VII**

Subject Name: ENVIRONMENTAL ENGINEERING- II

Subject Code: CE7PE42   **L-T-P-C: 3-0-0-3**

Course objectives:

Sl no	Course objectives
1	Learn concepts of waste water and sewer which required for proper sanitation
2	To understand the concepts of advance waste water treatment method and rural sanitation
3	To know Air and noise pollution and also safety measures to be considered in site
4	To know about environmental issues and laws which required for engineers to make environment for better tomorrow

UNIT	Description	Hours
I	**Introduction:** Need for sanitation, methods of sewage disposal, types of sewerage systems, dry weather flow, wet weather flow, estimation of storm water flow-numerical. **Design of sewers**: Hydraulic formula to determine velocity and discharge. Self cleansing and non scouring velocity. Design of hydraulic elements for circular sewers for full flow and half flow conditions.	8
II	**Advance wastewater treatment**: Sequential batch reactor(SBR) and membrane batch reactor (MBR)-only concept No design Nitrification and Denitrification Processes, Phosphorous removal Electro coagulation, **Rural sanitation:** Working principal and design of septic tanks for small community in rural and urban areas, two-pit latrines, eco-toilet and soak pits. Principle of stabilization ponds, oxidation ditch, Sludge digesters(aerobic and anaerobic)- no design	8

III	**Air Pollution:** Definition of air pollution, Composition & structure of atmosphere Emission Sources, Classification and Characterization of atmospheric pollutants, Bhopal Gas Tragedy, Factors to be considered in industrial plant location. **Effects of Air Pollution**: On Human Health, Animals, Plants and Materials, **Air Pollution Due To Automobiles, Noise pollution**: Sources, measurement, effects, standards & control,	8
IV	**Occupational Health and Safety Considerations:** Safety, History and development, National Safety Policy. Occupational safety and Health Act (OSHA).Water and wastewater treatment plants, Handling of chemical and safety measures in water and wastewater treatment plants and labs, industries like cement plants, RMC Plants, precast plants and construction sites. Policies, roles and responsibilities of workers, managers and supervisors.	7
V	**Global Environmental issues: Causes, Effect and control** Acid Rain, global warming, ozone deletion Environmental impact assessment-step by step procedure in conducting EIA Ground water contamination Indoor air pollution Environmental laws: water act, air act, Environmental protection act-scope and objective only	8

Course Outcomes

Course outcome	Descriptions
CO1	Students were able to design the sewers and storm water drains
CO2	Students were able to know about advance technologies in wastewater treatment and rural sanitation
CO3	Students were able to know about air and noise pollution and its control
CO4	Students will know about the operational safety measures in site and global environmental issues and laws to make cleaner environment for better tomorrow

Civil Engineering Department

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	1	3	2	2	1	1	2	3
CO2	3	2	2	2	2	3	2	2	1	1	1	1
CO3	3	3	2	2	2	3	2	1	1	1	3	1
CO4	2	3	2	2	1	2	2	1	1	1	2	1

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Environmental Engineering	Howard S. Peavy, Donald R. Rowe, George T	McGraw Hill International Edition. New York,2000
2	Environmental Engineering vol-II	S. K. Garg	Environmental Engineering vol-I M/s Khanna Publishers, New Delhi2010

Reference Book:

Sl No	Text Book title	Author	Volume and Year of Edition
1	, "Wastewater Engineering Treatment and Reuse",	Metcalf and Eddy Inc Publishing Co. Ltd.,	Metcalf and Eddy Inc, "Wastewater Engineering
2	Environmental engineering	P Venugopala rao,	prentice hall of india pvt ltd, new delhi
3	Text book of Air Pollution and Control Technologies	Anjaneyulu Y	Allied Publishers,2002
4	"Occupational Safety and Health for Technologists,	Goetsch D. L.,(1999),	Engineers and Managers", Prentice Hall.

Civil Engineering Department

Scheme & Syllabus 2020

Department: Civil Engineering   **Semester: VII**

Subject Name: GROUND WATER HYDROLOGY

Subject Code: CE7PE43   **L-T-P-C: 3-0-0-3**

Course Objectives

Sl.No	Course Objectives
1	To make the student understand about aquifer properties, well data analysis, steady and unsteady analysis culminating in well design

UNIT	Description	Hours
I	**Introduction :**Aquifer, aquifuge,, aquitard and aquiclude. Confined and unconfined aquifers. Hydrologic budget. Aims of Arficial methods of recharge project, Basin method of recharge, stream channel methods, Ditch and furrow method, flooding method, pit method, recharge well method, induced recharge, Artificial recharge for energy purposes **Aquifer Properties** Aquifer parameters. Specific yield. Specific retention, Porosity, storage coefficient. Land subsidence due to ground water withdrawals.	8
II	**Movement of ground water :** Darcy's law, Hydraulic conductivity, coefficient of permeability, Transmissibility. Permeability in anisotropic layered soils. **Well hydraulics steady flow :** Introduction. Steady radial flow in confined and unconfined aquifers and unconfined aquifer with uniform recharge	8
III	**Well Hydraulics, Unsteady Flow :** Introduction. General equationderivation, Tidal and Barometric efficiencies, Thies method, Cooper and jocob method, Chow's method, recovery test	8
IV	**Well Characteristics** Specific capacity of well, Characteristic well losses, Evaluation of well loss-drawdown procedure Roar Baugh procedure, well efficiency. Image Wells	7
V	**Types of Water wells:** Dug wells, Bored wells, Driven wells, jetted wells and Drilled tube wells – cable tool method, rotary and reverse rotary method **Design:** Design of gravel pack, and slot size of slotted screen pipe. Design of tube wells – size of bore hole, length of strainer, Type of pump, power of pump	8

Civil Engineering Department

Course Outcomes

Course outcome	Descriptions
CO1	Able to interpret aquifer properties and ground water flow.
CO2	Able to use in advanced methods of well data analysis and image wells and students are instructed in steady and unsteady analysis.
CO3	Able to design wells.

Course Articulation Matrix

CO \ PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	2	2	1	1		1	1	1
CO2	3	3	2	3	2	2	1	1		1	1	1
CO3	3	3	2	3	2	2	1	1		1	1	1
CO4	3	3	2	3	2	2	1	1		1	1	1

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Ground Water	H.M. Raghunath,	Wiley Eastern Limited, New Delhi.Current Edition
2	'Ground Water Hydrology,	K. Todd	Wiley and Sons, New Delhi. Current Edition

Reference Book:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Ground Water Hydrology	Bower H.	McGraw Hill, New Delhi.
2	Ground Water and Tube Wells	GargSatyaPrakash,	Oxford and IBH, New Delhi.
3	'Ground Water Resource Evaluation',	W.C. Walton,	McGraw Hill Kogakusha Ltd., New Delhi.

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Scheme & Syllabus 2020

Department: Civil Engineering   **Semester: VII**

Subject Name: Hydraulic structures & irrigation design

Subject Code: CE7PE51   **L-T-P-C: 3-0-0-3**

Course Objectives

Sl. No.	Course Objectives
1	To make the student understand about hydraulic structures like dams, spillways, weirs and notches and design them
2	To make the student understand about design of hydraulic structures

UNIT	Description	Hours
I	**Reservoir Planning** Introduction, classification of Reservoirs, Storage zones of a reservoir, Mass curve, fixing capacity of a reservoir, Inverse problem(safe yield), Reservoir sedimentation and calculation of life of a reservoir, economic height of a dam, problems.	10
II	**Earthen Dams** Introduction, types of Earth dams, construction methods, Design criteria for Earth dams, causes of failure of earth dams, section of dam, preliminary design criteria, Phreatic line theory and problems with horizontal filter(drainage blanket) near the toe, Phreatic line problems without filter, control of seepage through earth dams, Safety measures	10
III	**Design of :** 1. Surplus weir with stepped apron. 2. Notch type Canal Drop.	10
IV	**Spillways** Introduction, essentials of a spillway, spillway components, factors affecting type & design of spillways. Ogee spillway (simple design problems). Energy dissipation below spillways (hydraulic jump- No design).	10
V	**Gravity Dams** Introduction, forces on a gravity dam, stress analysis in gravity dam, Problems, combination of forces for design. Elementary & practical profiles of a gravity dam, stability analysis (without earth quake forces), problems, galleries in	10

Civil Engineering Department

Course Outcomes

Course outcome	Descriptions
CO1	Able to plan and understand the principles of construction and working of dams and obtain their designs
CO2	Able to plan, design profile and understand principles of working of spillways
CO3	Able to plan, design and understand principle of working of notches and weirs for irrigation

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	3	2	2	1	1		1	1	1
CO2	3	3	2	3	2	2	1	1		1	1	1
CO3	3	3	2	3	2	2	1	1		1	1	1
CO4												

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Irrigation and Water Power Engineering,	B C Punmia and PandeLal,	Laxmi Publication Limited, New Delhi. 2019 Ed.
2	Water Resource Engineering, Principles and Practice,	SatyaNarayana Murthy Challa,	New Age International Publishers, 2 Ed'n

Reference Book:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Design of minor irrigation and Canal structures-,	C.SathyaNarayana Murthy	Wiley eastern limited, New Delhi (1990 Ed)
2	Hydraulic Structures	Sheng Hong Chen	Springer 2015 Ed
3	Hydraulics of dams and river structures	FarhadYezdantloost Jalal Attari	Balkema Publishers 2019
4	Flow in Open Channels	K Subramanya	Tata McGraw-Hill Company Third Edition

Civil Engineering Department

Scheme & Syllabus 2020

Department: Civil Engineering   **Semester: VII**

Subject Name: Advance Design of RC Structures

Subject Code: CE7PE52   **L-T-P-C: 3-0-0-3**

Course Objectives

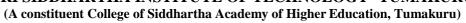| Sl.No	Course Objectives
1	This course will enable students to learn advanced design of RCC water tanks
2	To make student to understand design concept of RCC chimneys, silos
3	To make student to understand design concept of deep beams
4	To make student to understand design concept of Grid Design of Flat slabs

UNIT	Description	Hours
I	Design of RCC overhead circular and rectangular water tanks with supporting towers.	8
II	Design of RCC Chimneys.	8
III	Design of silos, Bunkers.	8
IV	Deep Beams: General features, Parameter influencing design, Flexural bending and shear stresses in deep beams. Design provisions of IS-456, Checking for local failures, Strut and tie analysis of deep beams, Detailing of reinforcement in deep beams.	8
V	Flat Slabs: Elements of flat slabs, Codal procedure for design of flat slabs, Behavior of flat slab in shear, One way and two way shear, Equivalent Frame Method, Openings in flat slabs, Effect of pattern loading in flat slabs.	7

Course Outcomes

Course outcome	Descriptions
CO1	Students will be able to design water tanks.
CO2	Students will be capable of designing silos & bunkers .
CO3	Students will be able to design deep beams.
CO4	Students will be able to Design different types of floor systems like flat slabs.

Course Articulation Matrix

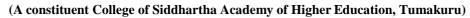| PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	2	1	2		3		1		2
CO2	3	3	3		3	2	2	3		1	2	2
CO3	3	3	3	3	3	2	2	3		1	2	2
CO4	3	3	3	3	3	2	2	3		1	2	2

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Advanced Reinforced Concrete Design	N Krishna Raju	CBS; 2 edition 2010
2	Advanced Reinforced Concrete Design	P.Cvarghese	PHI Learning Pvt.Ltd 2009
3	Advanced Reinforced Concrete Design	S.SBhavikatti	New Age International,2008

Reference Book:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Reinforced Concrete Structures	B C Punmia	Vol-II Laxmi Publications (P) Ltd, New Delhi.
2	Limit State Design of Reinforced Concrete	P C Varghese	Vol-II- Prentice Hall of India (P) Ltd, New Delhi.
3	Plain and Reinforced Concrete	Jai Krishna and Jain	Vol-II Nem Chand Bros, Roorkee
4	IS 456 2000 IS 3370	BIS	1967 (Part I, II and IS 1893)

Scheme & Syllabus 2020

Department: Civil Engineering   **Semester: VII**
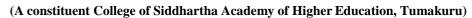
Subject Name: Structural Dynamics

Subject Code: CE7PE53   **L-T-P-C: 3-0-0-3**

Course Objectives

Sl.No	Course Objectives
1	This course will enable students to understand the basics principle of structural dynamics.
2	to understand the behavior of structures subjected to dynamic loads
3	to understand the analytical and numerical methods in structural dynamics withemphasis on vibration
4	to evaluate the dynamic characteristics of the structures

UNIT	Description	Hours
I	Introduction: Introduction to structural dynamics, brief history of vibration, Basic definitions, vibration of SDOF (Single Degree of Freedom) systems, undamped, Damped, Free vibrations, equivalent viscous damping, Logarithmic decrement	8
II	Forced vibrations of SDOF system, Response of undamped and damped system subjected to harmonic loading, response to SDOF subject to harmonic base excitation, Duhamel's integral, response to general system of loading, dynamic load factor, response spectrum	8
III	Free vibration of MDOF (Multi Degree Freedom System), Natural frequencies, Normal modes, Orthogonality of normal modes, Eigen Values Shear buildings modeled as MDOF systems. Free vibrations, Natural frequencies	8
IV	Forced vibrations, Motion of shear buildings, Model Superposition Method, Response to shear buildings, Base motion, Harmonic fixed excitation. Damped motion of shear buildings, Equations for damped shear buildings,uncoupled damped equations, Conditions for damping uncoupled	8
V	Dynamic analysis of base stuffiness matrices, Lumped mass and consistent mass formulation, Equations of motion	7

Civil Engineering Department

Course Outcomes

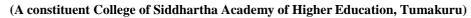| Course outcome	Descriptions
CO1	Students will be able to analyse building to various dynamic loads: such as wind, earthquake, machine vibration and ambient vibration
CO2	To apply knowledge of mathematics, science, and engineering by developing the equations of motion for vibratory systems and solving for the free and forced response
CO3	To Interpret dynamic analysis results for designing the suitable structural element,
CO4	To apply structural dynamics theory to earthquake analysis.

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3		2	3	2				1
CO2	3	3	3	3		2	3	2				1
CO3	3	3	3	3		2	3	2				1
CO4	3	3	3	3		2	3	2				1

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Vibrations, structural dynamics	M. Mukhopadhaya	Oxford IBH
2	Structural Dynamics	Mario Paz	CBS publishers

Reference Book:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Structural Dynamics	Anil Chopra	PHI Publishers
2	Structural Dynamics	Clough &Penzen	TMH

Civil Engineering Department

Scheme & Syllabus 2020

Department: Civil Engineering   **Semester: VII**

Subject Name: ENVIRONMENTAL ENGG. LABORATORY

Subject Code: CE7LB1   **L-T-P-C: 0-0-3-1.5**

Course Objectives

Sl.No	Course Objectives
1	This course will enable students to learn different methods of water & waste water quality
2	This course will enable students, to conduct experiments to determine the concentrations of water and waste water
3	This course will enable students to understand the environmental significance and application in environmental engineering practice
4	This course will enable students to determine the degree and type of treatment

Sl. No.	Description	No of hrs
1	Determination of Solids in Sewage: Total Solids, Suspended Solids, Dissolved Solids, Volatile Solids, Fixed Solids, Settleable Solids	3
2	Determination of Chlorides	3
3	Determination of Alkalinity, Acidity and pH	3
4	Determination of Calcium, Magnesium and Total Hardness	3
5	Determination of Dissolved Oxygen. Determination of BOD	3
6	Determination of percentage of available chlorine in bleaching powder, Residual Chlorine and Chlorine Demand	3
7	Jar Test for Optimum Dosage of Alum, Turbidity determination by	3
8	Determination of Iron, fluorides, copper.	3

Course Outcomes

Course outcome	Descriptions
CO1	Students will have skill to assess water quality parameters and compare it with standards
CO2	Students able to do assessment of wastewater quality and decide the treatment methods and its cost
CO3	Students able to evaluate the adverse effects of water quality and wastewater on humans and environment
CO4	The students can decide on treatment methods, its cost of treatment, performance study of existing treatment

Civil Engineering Department

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2		1	3	2	2	3	1	1	1	2
CO2	3	2		1	2	2	2	2	1	1	1	1
CO3	2	3		1		2	2	2	3	2	1	1
CO4	1	2	1			2	2	2	1	1	2	1

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Standard methods, for the examination of	BIS	16th Edition, APHA, AWWA, WPCF
2	Environmental Pollution Analysis	SM Khopkar	New Age International Publishers

Reference Book:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Manual of Water and Wastewater Analysis NEERI Publication	BIS	
2	Standard Methods for Examination of Water and Wastewater (1995), American Publication Association, Water Pollution Control Federation, American Water Works Association, Washington DC		American Publications
3	IS Standards : 2490-1974, 3360-1974, 3307-1974. Chemistry for Environment Engineering. Sawyer and McCarthy	BIS	

Civil Engineering Department

Scheme & Syllabus 2020

Department: Civil Engineering   **Semester: VII**

Subject Name: Internship

Subject Code: CE7LB2   **L-T-P-C: 0-0-3-1.5**

Course Objectives

Sl. No	Course Objectives
1	To train the students to industrial practices relevant to civil engineering domain
2	To collect and interpret the data obtained in the field

Students will undergo internship training for a period of 21 days, pertaining to a specific aspect of civil engineering with well-defined limited scope and objectives. Students should undergo internship during their vacation at the end of VI semester, will visit an industry / construction site. During this process, they finalize the objectives and scope of work, under the guidance of a supervisor/ representative of the industry. They present the study in the form of a report under guidance of the faculty member during VII semester as a part of curriculum.
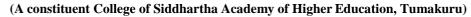
Course Outcomes

Course outcome	Descriptions
CO1	Able to identify and define the project for which training
CO2	To draw conclusions and suggest the suitable strategies related to internship

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	2	3	3	1	3	1	3	2
CO2	2	2	2	2	2	3	2	1	3	1	3	2
CO3												
CO4												

Civil Engineering Department

Scheme & Syllabus 2020

Department: Civil Engineering   **Semester: VII**

Subject Name: Project Phase - I

Subject Code: CE7PW1   **L-T-P-C: 0-0-4-2**

Course Objectives

Sl. No	Description
1	To train the students to do literature survey in the preparation of synopsis.
2	To train the students to prepare synopsis report.

- ❖ The project batches shall be formed during the 7th semester. The students shall form the batches on their own (i.e., group of likeminded students) and shall approach a staff member for his / her consent to guide the project work.
- ❖ The number of students in a batch shall be normally being limited to maximum 4 and in exceptional cases; it may be minimum 2.
- ❖ A faculty member shall guide at least one project batch and shall not guide more than 3 batches.
- ❖ The students of the project batch shall prepare a synopsis of the intended project work and submit the same to the department.
- ❖ The internal evaluation shall be done by project evaluation committee of the department to scrutinize the synopsis submitted by the project batches through presentation.
- ❖ The committee shall give suggestions to improve the quality of work in the approval of the synopsis and students shall incorporate the changes if necessary.
- ❖ The project evaluation committee shall consist of the Head of the Department or his nominee as the Chairman, the guide and one faculty member identified by the Chairman. If any member is himself / herself the guide, another faculty member shall be co-opted, limiting the total number of the members of the committee to 3.

Course Outcomes

Course outcome	Descriptions
CO1	Able to collect data by different methods and organize them.
CO2	Interpret the test data/ results, draw conclusions and suggest strategies as the case may be.

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	2	3	2	2	3	3	3	2
CO2	3	3	1	3	1	2	2	2	3	3	3	2

Civil Engineering Department

VIII SEMESTER B.E.

	VIII Semester B.E. (Common to all UG programs) (Subjects and Syllabus as per AICTE-Model Curriculum for UG Course in Eng. & Tech.- 2020-21)						Examination			
SI No	**Course and Course Code**		**Course Title**	**Teaching dept.**	**Board of Exam.**	**Credits**	**CIE**	**SEE**	**Total Marks**	**Exam Hrs.**
01	PE	CE8PE1x	**Professional Elective-VI**	CE	CE	3	50	50	100	3
02	PE	CE8PE2x	**Professional Elective-VII**	CE	CE	3	50	50	100	3
03	PC	CE8TS1	**Technical Seminar**	CE	CE	2	50	50	100	3
04	PC	CE8PW2	**Project Phase-2**	CE	CE	8	50	50	100	3
			Total			16	200	200	400	-
	CIE-Continuous Internal Evaluation, SEE-Semester End Examination									

Professional Elective VI:	**Professional Elective VII:**
CE8PE11: Design & drawing of Steel Structures **CE8PE12: Finite Element Analysis** **CE8PE13: Numerical Methods in Civil Engineering**	**CE8PE21: Bridge Engineering** **CE8PE22: Advanced Foundation Engineering** **CE8PE23: Industrial wastewater treatment**

Department of Civil Engineering

Scheme & Syllabus 2020

Department: Civil Engineering   **Semester: VIII**

Subject Name: DESIGN & DRAWING OF STEEL STRUCTURES

Subject Code: CE8PE11   **L-T-P-C: 3-0-2-3**

Course Objectives:

Sl.No	Course Objectives
1.	To learn the concepts of steel connections and details of structural drawing.
2.	To learn the concepts of column Splices, lacing, battens.
3.	To learn the concepts of column bases.
4.	To learn the design of roof truss and welded plate girder.

UNIT	Description	Hours
	PART – A	15
I	**CONNECTIONS**: Bolted and welded, beam-beam, Beam-column, seated, stiffened and un-stiffened.	
II	**COLUMNS**: Splices, Column-column of same and different sections. Lacing and battens.	
III	**COLUMN BASES**: Slab base and gusseted base, grillage foundation.	
	PART – B	35
IV	Design and drawing of Roof Truss (Forces in the members to be given)	
V	Design and drawing of i) Bolted and welded plate girder ii) Gantry girder	

Course Outcomes

Course outcome	Descriptions
CO1	Students are able to make drawing to the suitable scale for the beam to beam connection and beam to column connection, columns splicing both welded and
CO2	Students are able to make drawing to the suitable scale for the design given to slab base, gusseted base and grillage foundation.
CO3	Students are able to design and draw to the suitable scale for the roof truss, And plate girder both welded and bolted.
CO4	Students are able to design and draw to the suitable scale for the gantry girder.

Civil Engineering Department

Course Articulation Matrix

CO \ PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	3	3	3	3	2		1
CO2	3	3	3	3	1	3	3	3	3	2		1
CO3	3	3	3	3	1	3	3	3	3	2		1
CO4	3	3	3	3	1	3	3	3	3	2		1

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1.	Reinforced Concrete Design	Unnikrishnan Pillai and Devdas Menon,	Mc Graw hill education India Pvt Limited 3rd edition 2016
2.	Design of Concrete Structures	Subramanian. N	Oxford Higher Education 5thEdition 2014
3.	Limit State Design of Steel Structures	S. K. Duggal,	Tata McGraw Hill Education Private Limited, New Delhi, India, II edition 2015
4.	Design of Steel Structures	N. Subramanian	Oxford University Press, New Delhi, India, 2016. Third Edition

Reference Book:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Limit State Design of Reinforced Concrete	Arun KR jain, Ashok kumar jain and BC Punmia	Laxmi Publications, New Delhi revised edition 2016
2	IS 456:2000 and SP 16	Bureau of Indian Standards,	2000
3	Design of Steel Structures	P. Dayarathnam	Prentice Hall India, New Delhi, India, 2016 III edition
4	IS800-2007, & Steel tables	Bureau of Indian Standards,	General Construction in Steel Code Practice 3rd edition 2007

Civil Engineering Department

Scheme & Syllabus 2020

Department: Civil Engineering   **Semester: VIII**

Subject Name: Finite Element Analysis

Subject Code: CE8PE12   **L-T-P-C: 3-0-0-3**

Course objectives:

Sl no	Course objectives
1	Develop analytical skills.
2	Learn principles of analysis of stress and strain.
3	Develop problem solving skills.
4	Understand the principles of FEM for one and two dimensional problems.

UNIT	Description	Hours
I	Introduction to FEA and FEM, Theory of elasticity concepts, Energy principles, Rayleigh - Ritz Method, Galerkin method and finite element method, steps in finite element analysis, displacement approach, stiffness matrix and boundary conditions.	8
II	Discretisation; finite representation of infinite bodies and discretisation of very large bodies, Natural Coordinates, Shape functions; polynomial, Lagrange and Serendipity , one dimensional formulations; beam and truss with numerical examples.	7
III	2D formulations; Constant Strain Triangle, Linear Strain Triangle, 4 and 8- noded quadrilateral elements, Numerical Evaluation of Element Stiffness -Computation of Stresses, Static Condensation of nodes, degradation technique, Axisymmetric Element.	8
IV	Iso-parametric concepts; is opera metric, sub parametric and super parametric elements, Jacobian transformation matrix, Stiffness Matrix of Iso-parametric Elements, Numerical integration by Gaussian quadrature rule for one, two and three dimensional problems.	8
V	Techniques to solve non-linearities in structural systems; material, geometric and combined non linearity, incremental and iterative techniques. Structure of computer program for FEM analysis, description of different modules, exposure to FEM soft wares.	8

Civil Engineering Department

Course Outcomes

Course outcome	Descriptions
CO1	Understand the concepts behind formulation methods in FEM.
CO2	Identify the application and characteristics of FEA elements such as bars,beams.
CO3	Develop element characteristic equation and generation of global equation.
CO4	Able to apply suitable boundary conditions to a global equation for bars and trusses, beams problems and solve them displacements, stress and strains induced.

Course Articulation Matrix

CO \ PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	3	2	2	3		1	1	1
CO2	3	3	2		2	2	2	3		1	1	1
CO3	3	3	2	2	2	2	2	3		1	1	1
CO4	3	3	2	2	2	2	2	3		1	1	1

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Finite Element analysis	Krishnamoorthy C.S.,	Second Edition & 1994
2	Introduction to Finite element Method	Desai C & Abel J F	East West Press Pvt. Ltd& 2006

Reference Book:

Sl No	Text Book title	Author	Volume and Year of Edition
1	A first course on Finite element Method	Daryl L Logan,	Fourth edition
2	Finite Element Procedures in Engineering analysis	Bathe K J	Second Edition
3	Concepts and applications of Finite Element analysis	Cook R D et.al.	Fourth Edition

Civil Engineering Department

Scheme & Syllabus 2020

Department: Civil Engineering   **Semester: VIII**

Subject Name: NUMERICAL METHODS IN CIVIL ENGINEERING

Subject Code: CE8PE13   **L-T-P-C: 3-0-0-3**

Course Objectives

Sl.No	Course Objectives
1	To educate the students on the availability of various numerical methods of Integration
2	To educate the students on the availability of various numerical methods in Ordinary Differential Equation
3	To educate the students on the availability of various numerical methods in different domain of structural mechanics of civil engineering.

UNIT	Description	Hours
I	**Introduction**: Historical development of Numerical techniques, role in investigations, research and design in the field of civil engineering Development of Algorithm/ Flow Charts for Following Methods for Solution of Linear Simultaneous Equation: a) Gaussian elimination method, b) Gauss-Jordan matrix inversion method, c) Gauss-Siedel method d) Factorization method	8
II	**Application of Solution of Linear System of Equations to Civil Engineering Problems:** Construction planning, slope deflection method	8
III	**Application of Numerical Integration For Solving Simple Beam Problems:** Development of algorithm for a) Trapezoidal rule and b) Simpson's one third rule and its application for computation of area of BMD drawn for statically determinate beams. New Marks method for computation of slopes and deflections in statically determinate beams	8
IV	**Development of algorithm and application of solution of ordinary differential equation to civil engineering problems by:** a) Euler's method b) RungeKutta 4th order method	7

V	**Application of Finite Difference Technique In Structural Mechanics**: i. Introduction, expression of derivatives by finite difference: backward differences, forward differences and central differences. ii. Application of finite difference method for analysis of a) statically determinate beams, b) statically indeterminate beams Application of Finite difference technique in structural mechanics (Contd..) a) Buckling of columns, b)Beams on elastic foundation.	8

Course Outcomes

Course outcome	Descriptions
CO1	Students will acquire the knowledge of algorithms of numerical integration
CO2	Student will acquire skill of use of Ordinary Differential Equations
CO3	Student will acquire the skills of development of algorithms, finite difference techniques in structural mechanics.

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	3	2	1	2		1	1	1
CO2	2	3	2		2	2	2	1		1	1	1
CO3	2	3	2	2	2	1	2	1		1	1	1
CO4	3	3	2	2	2	2	1	1		1	1	1

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Numerical Methods for Engineers-	Chapra S.C. &R.P.Canale	McGraw Hill, 1990.
2	Numerical methods in Engineering Problem	N.KrishnaRaju,K.U.Muthu	MacMillan Indian Limited, 1990: Galgotia, New Delhi,1997

Reference Book:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Numerical methods in Computer Programs in C"	Pallab Ghosh	Prentice Hall of India Private Limited, New Delhi, 2006.
2	Numerical methods for engineers using MATLAB and C	I Edition SCHILLING	"Thomson Publications".
3	Numerical Recipes in Fortran 77 Art of scientific computing	William H Press	ISBN-13:978-0521430647

Scheme & Syllabus 2020

Department: Civil Engineering   **Semester: VIII**
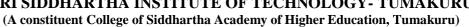
Subject Name: BRIDGE ENGINEERING

Subject Code: CE8PE21   **L-T-P-C: 3-0-0-3**

Course Objectives:

Sl.No	Course Objectives
1.	To learn basic concepts of bridges.
2.	To learn about IS codal provisions in design of bridges.
3.	To understand the concept of design of culverts.
4.	To understand the design of RCC and PSC bridges.

UNIT	Description	Hours
I	Introduction: Classification of Bridges – Masonry, Arches RCC, Prestressed Concrete, Steel and composite bridges. Brief description of different types of bridges. Investigation of Bridge Site: Selection Sites — Selection of type of bridge, Hydrological and Geotechnical investigations. Stability analysis Bridge Sub-Structures & Foundations: Foundations – Depth of foundation – Types of foundations (Pile, raft, well and caisson – brief description only) Coffer dams and Sheet piles.	8
II	Loads on Bridges: Introduction to different types of bridge loading (static, dynamic, seismic and IRC) on roads and bridges. Design of Pipe culvert for IRC class AA loadings.	8
III	Design of Box culvert for IRC class AA loadings. Design of SLAB culverts and slab bridges for IRC class AA loadings.	8
IV	Design of RCC slab bridges for IRC class AA loadings and design of interior panel of RCC bridges,	8
V	Introduction to segmental PSC Bridges Design of PSC slab bridges for IRC class AA loadings. Introduction to Bridge bearings – Types &functions of bearings – Loads on bearings	7

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Course Outcomes

Course outcome	Descriptions
CO1	Students will be made familiar about hydrological data regarding the bridge site.
CO2	Students will be made familiar about bridge sub structure and IRC loads, design and maintenance of bridges.
CO3	Students will be made familiar about components of bridge structure and design of RC bridge for IRC loads.
CO4	Students will be made familiar about design of PSC bridges and Bridge bearings.

Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	3	3	3	3	2		1
CO2	3	3	3	3	1	3	3	3	3	2		1
CO3	3	3	3	3	1	3	3	3	3	2		1
CO4	3	3	3	3	1	3	3	3	3	2		1

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Bridge Engineering	S.Ponnuswamy	McGraw Hill Book Company, III Edition, 2016
2	Bridge Engineering	Johnson & Victor	Oxford & IBH Publishing Co New Delhi
3	Design of Bridges	Jayram&Jagadish	Tata McGraw-Hill Publishing Co ltd., New Delhi 2016

Reference Book:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Bridge Engineering	S.P.Bindra	DhanpatRai&SonsNew Delhi
2	Principles and Practice of Bridge Engineering	S.P.Bindra	DhanpatRai&SonsNew Delhi
3	IRC 6 ,18,21–2000	Standard Specifications and Code of Practice For Road Bridges	The Indian Road Congress New Delhi
4	Design of bridge	Dr. Krishna Raju	Oxford & IBH Publishing Co New Delhi

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Department: Civil Engineering   **Semester: VIII**

Subject Name: Advanced Foundation Engineering

Subject Code: CE8PE22   **L-T-P-C: 3-0-0-3**

Course objectives:

Sl No	Description
1	Gain knowledge of geotechnical aspects in foundation design.
2	Develop profound understanding of shallow and deep foundation analysis.
3	Develop understanding of choice of foundation design parameters.
4	Learn about cause and effect of liquefaction on foundation.

UNIT	Description	Hours
I	**Shallow Foundations**: Principles of Design of foundation,Requirements for geotechnical and structural aspects of design, Proportioning of Isolated footing, Combined Footing, Strap footing, Strip footing and Raft foundation.	7
II	**Pile Foundation:** Historical Development, Necessity of pile foundations, Classification, Load carrying capacity of piles by Static formula in cohesive and cohesionless soils. Pile groups, group action of piles in sand and clay, group efficiency of piles and negative skin friction. Numerical problems on above. Introduction to micro piles.	9
III	**Well Foundations**: Introduction, Classification of well foundation, Components of well foundation. Forces acting on well foundation, Sinking of wells, Causes and remedies for tilts and shifts. Drilled Piers and Caissons-Construction, advantages and disadvantages of drilled piers. Design concepts and Advantages and disadvantages of open, pneumatic and floating caissons.	9
IV	**Liquefaction of soils:** Introduction, Phenomenon, factors affecting liquefaction, assessment of susceptible soil to liquefaction, measures for reducing the damage to structures due to liquefaction.	6
V	**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.	8

Civil Engineering Department

Course Outcomes:

Course outcome	Descriptions
CO1	Able to differentiate different types of foundations systems.
CO2	Able to design pile and well foundation including design.
CO3	To assess the soils susceptible to liquefaction and its effect on structures.
CO4	To enhance the knowledge of placing of foundations in expansive soils.

Course Articulation Matrix

CO \ PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	2	2	2	3	1	1		1
CO2	3	3	3		2	3	2	3	1	1	1	1
CO3	3	2	2	3	2	3	2	2		1	2	1
CO4	3	3	3	2	3	2	3	2	1	1	1	2

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	"Pile Design, Construction And Practice",Taylor And Francis Publications, New York.	Michael Tomlinson And John Woodward	5th Edition, 2008
2	"Soil Mechanics And Foundation Engineering", UBS Publishers And Distributors, New Delhi.	V N S Murthy	6th Edition, 2009

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	"Theory And Practice Of Foundation Design", Prentice Hall Of India, New Delhi.	N NSom And S C Das	3rd Edition, 2009
2	"Soil Mechanics Fundamentals", John Wiley And Sons Publications, New York.	Muni Budhu And Wiley Blackwell	1st Edition, 2006
3	"Pile Foundations In Engineering", Wiley Inter-Science Publications, New York.	ShamsherPrakash And Hari D Sharma	2nd Edition, 2005
4	"Geotechnical Engineering", New Age Publications, New Delhi	Venkatramaiah C	3rd Edition, 2009

Civil Engineering Department

Scheme & Syllabus 2020

Department: Civil Engineering   **Semester: VIII**

Subject Name: Industrial wastewater treatment
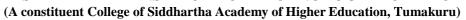
Subject Code: CE8PE23   **L-T-P-C: 3-0-0-3**

Sl. no	Course Objectives
1	To understand the current environmental issues on effect of industrial wastewateron water bodies and wastewater treatment plants.
2	To understand the various techniques of industrial wastewater treatment methods.
3	To study the Manufacturing processes, waste water characteristics and treatmentmethods of various industries.

UNIT	Description	Hours
I	**Introduction**: Difference between Domestic and Industrial Wastewater, Effect on Streams and on Municipal Sewage Treatment Plants. Stream Sampling, effluent and stream Standards and Legislation to Control Water Pollution. Dissolved oxygen Sag Curve in Stream.	08
II	**Treatment Methods:** Volume Reduction, Strength Reduction, Neutralization, Equalization and Proportioning. Removal of Inorganic suspended solids, Removal of Organic Solids, Removal of suspended solids and colloids. Disposal of Sludge Solids.	08
III	**Combined Treatment:** Feasibility of combined Treatment of Industrial Raw Waste with Domestic Waste, Discharge of Raw, Partially Treated and completely treated Wastes to Streams.	07
IV	**Treatment process:** Flow sheet showing origin / sources of waste water, characteristics of waste, alternative treatment methods, disposal, reuse and recovery along with flow sheet. Effect of waste disposal on water bodies.	08
V	**Treatment of Selected Industrial Waste**: Manufacturing process, waste water characteristics, treatment and disposal of waste water of following industries: Dairy, distillery, sugar, textile, paper and pulp, pharmaceutical, fertilizer.	08

Course outcome	Descriptions
CO1	The students are instructed to know the difference between domestic and industrial waste water characteristics, disposal standards, importance of dissolved oxygen, O_2 sagcurve, streeter phelps equation.
CO2	Students are imparted with knowledge of treatment with volume, strength,neutralization equalization and proportioning concepts.
CO3	Enable students to use specific method of treatment for cotton, tannery, distillery,papers pulp, pharmaceutical and food processing industries.

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Course Articulation Matrix

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	1	3	2	2	1	1	2	3
CO2	3	2	2	2	2	3	2	2	1	1	1	1
CO3	3	3	2	2	2	3	2	1	1	1	3	1
CO4	2	3	2	2	1	2	2	1	1	1	2	1

Text Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	Industrial Waste Water Treatment	Nelsol L. Nemerow.	
2	Industrial Waste Water Treatment	Rao MN, and Dutta A.K.	
3	Waste Water Treatment, Disposal and Reuse	Metcalf and Eddy	Tata McGraw Hill Publications, 2003.

Reference Books:

Sl No	Text Book title	Author	Volume and Year of Edition
1	"Industrial Wastewater Treatment"	Patwardhan A.D.	PHI Learning Private Ltd., New Delhi, 2009
2	"Pollution Control Processes in industries"	Mahajan S.P.	

Civil Engineering Department

Scheme & Syllabus 2020

Department: Civil Engineering   **Semester: VIII**

Subject Name: Technical Seminar

Subject Code: CE8TS1   **L-T-P-C: 0-0-0-2**

Course Objectives

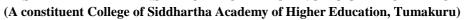| Sl. No	Description
1	To enable the student to select relevant civil engineering topic for seminar presentation.
2	To train the student to compile a technical report and presentation material.
3	To enhance the technical and communication skills.

Description

- ❖ Each student shall give a technical seminar on a topic of civil engineering interest.
- ❖ Each student shall submit the title of the intended topic of seminar to the seminar evaluation committee of the department.
- ❖ The seminar evaluation committee shall scrutinize the titles submitted by the students and inform the students about the approval or suggestions to be incorporated to the title of the seminar.
- ❖ Each student shall submit the seminar report conforming to the standards and format prescribed by the department.
- ❖ The students shall give seminar on the topics approved by the seminar evaluation committee. The members of seminar evaluation committee shall be identified by HOD.

Course Outcomes

Course outcome	Descriptions
CO1	Appraise the current civil engineering research/ techniques / developments / interdisciplinary areas
CO2	Formulate seminar topic by utilizing technical resources/ Journals/ web sources & Carry out detailed review of available literature.
CO3	Compose technical report and defend the presentation.

Course Articulation Matrix

CO \ PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		1	1		1	1	1	3	2		
CO2	2		2	2		1			2		2	2
CO3								1		2		1

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Department: Civil Engineering   **Semester: VIII**

Subject Name: Project work phase II

Subject Code: CE8PW2   **L-T-P-C: 0-0-16-8**

Course Objectives

Sl. No.	Course Objectives
1.	To impart skills to work in teams
2.	To apply the acquired theoretical knowledge for solving practical problems.
3.	To develop report preparation and presentation skills.

Description
❖ The continuation of main Project Work will be done after the synopsis approval by the Departmental Evaluation Committee.   ❖ After the synopsis approval LABORATORY INVESTIGATIONS will be carried out and data will be compiled suitably.   ❖ Organize the data and prepare report.   ❖ Defend the presentation.   ❖ The end term practical examination for the project work will be assessed by internal and external examiners.

Course Outcomes

Course outcome	Descriptions
CO1	Team spirit is cultivated and leadership qualities are acquired
CO2	Analyzing the result and concluding remarks are carried out.
CO3	Able to analyze, design and implement solutions for practical problems.

Civil Engineering Department

Course Articulation Matrix

CO \ PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						2		2	3	3	1	1
CO2	3	3	3	2	3	2	3	3	3	3	3	1
CO3	3	2	3	3	3	2	2	3	3	3	3	2

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