Government College of Engineering Jalgaon

Civil Engineering Department

TYBTech Syllabus

2016-17

GOVERNMENT COLLEGE OF ENGINEERING JALGAON
Department of Civil Engineering.
Scheme for B.Tech (Civil Engineering)
SEM V

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation scheme							Credits
			TH	TU	PR	Total	Theory				Practical			
							ISA	ISE1	ISE2	ESE	ICA	ESE	Total	
CE301	Basic Theory of Structures	D	3	---	---	3	10	15	15	60	---	---	100	3
CE302	Design of RCC Structures	D	3	---	---	3	10	15	15	60	---	---	100	3
CE303	Geotechnical Engineering	D	3	---	---	3	10	15	15	60	---	---	100	3
CE304	Environmental Engineering-I	D	3	---	---	3	10	15	15	60	---	---	100	3
CE305	Fluid Mechanics-II	D	3	---	---	3	10	15	15	60	---	---	100	3
CE306	Design of RCC Structures -LAB	D	---	---	2	2	---	---	---	---	25	25	50	1
CE307	Geotechnical Engineering -LAB	D	---	---	2	2	---	---	---	---	25	25	50	1
CE308	Environmental Engineering-I-LAB	D	---	---	2	2	---	---	---	---	25	25	50	1
CE309	Fluid Mechanics-II-LAB	D	--	---	2	2	---	---	---	---	50	--	50	1
CE310	Testing of Materials-LAB	B	1		2	3					25	25	50	2
CE311	Self Study(CE301/CE302/CE303/CE304/CE305)	D	---	---	--	--	---	---	---	---	--	--	50**	2
	Total		16		10	26	50	75	75	300	150	100	800	23

TH: Theory Lecture   **TUT: Tutorial**   **PR: Practical**
  ISA: Internal Sessional Assessment   **ISE : In Semester Examination**   **ESE: End Semester Examination, ICA : Internal Continuous Assessment**

● ****Marks and hence grade of course Self Study shall be based on one test each conducted on 20% syllabus of five subjects - CE301, CE302, CE303, CE304, CE305. One faculty member should be appointed as course coordinator for the course 'self study' to compile the marks of all tests and enter in to MIS.**
● **The 20% syllabus for self - study shall be declared by subject teacher at the beginning of semester and he/she shall conduct the test examination for that course, assess answer papers of test examination and submit the marks to course coordinator**

GOVERNMENT COLLEGE OF ENGINEERING JALGAON
Department of Civil Engineering.
Scheme for B.Tech (Civil Engineering)
SEM VI

Course Code	Name of the Course	Group	Teaching Scheme Hrs /week				Evaluation Scheme							Credits
			TH	TU	PR	Total	Theory				Practical			
							ISA	ISE1	ISE2	ESE	ICA	ESE	Total	
CE351	Advanced Theory of Structures	D	3	---	---	3	10	15	15	60	---	---	100	3
CE352	Design of Steel Structures	D	3	---	---	3	10	15	15	60	---	---	100	3
CE353	Foundation Engineering	D	3	---	---	3	10	15	15	60	---	---	100	3
CE354	Environmental Engineering-II	D	3	---	---	3	10	15	15	60	---	---	100	3
CE355	Construction Management	C	3	---	---	3	10	15	15	60	---	---	100	3
CE356	Design of Steel Structures -LAB	D	---	---	2	2	---	---	---	---	25	25	50	1
CE357	Foundation Engineering -LAB	D	---	---	2	2	---	---	---	---	50	--	50	1
CE358	Environmental Engineering-II-LAB	D	---	---	2	2	---	---	---	---	25	25	50	1
CE359	Software's in Civil Engineering-LAB	B	---	---	2	2	---	---	---	---	25	25	50	1
CE360	Mini Project	D	---	---	2	2	---	---	---	---	25	25	50	2
CE361	Self Study(CE351/CE352/CE353/CE354/CE355)	D	---	---	---	---	---	---	---	---	--	---	50**	2
CE362	Industrial Lecture	D	1	---	---	1	---	---	---	---	--	---	--	---
	Total		16	---	10	26	50	75	75	300	150	100	800	23

TH: Theory Lecture   **TUT: Tutorial**   **PR: Practical**
ISA: Internal Sessional Assessment   **ISE : In Semester Examination**   **ESE: End Semester Examination, ICA : Internal Continuous Assessment**

*Evaluation of the course CE362 Industrial Lectures shall be done in VIII th   semester along with the subject CE460 Industrial Lectures

• **Marks and hence grade of course Self Study shall be based on one test each conducted on 20% syllabus of five subjects-CE351,CE352,CE353, CE354, CE355. One faculty member should be appointed as course coordinator for the course 'self study' to compile the marks of all tests and enter in to MIS.**

• **The 20% syllabus for self - study shall be declared by subject teacher at the beginning of semester and he/she shall conduct the test examination for that course, assess answer papers of test examination and submit the marks to course coordinator.**

CE301 BASIC THEORY OF STRUCTURES

Teaching Scheme: 03L+ 00 T, Total: 03   **Credit**: 03
Evaluation Scheme: 15 ISE1 +15 ISE2 + 10 ISA + 60 ESE   **Total Marks**: 100
Duration of ESE: 03Hrs

Deflection of Beams: Relation between bending moment, slope and defection, introduction to double integration method, concept of moment area method, Mohr's theorems, use of moment area method to calculate slope and deflections of beams such as simply supported, over hanging and of uniform cross sections and different cross sections. Conjugate beam method, application of conjugate beam method to simply supported, overhanging and compound beams.

Slope and Deflection: Castiglione's first theorem and its application to find slope and deflection of simple beams and frames, deflection in determinate trusses. Analysis of redundant trusses by Castiglione's second theorem, lack of fit and temperature changes in members, sinking of supports (degree of indeterminacy up to 2)

Fixed Beams:- Concept, advantages and disadvantages, nature of bending moment diagrams, fixed end moment due to various types of loads such as point, uniformly distributed, uniformly varying, couples for beams, effect of sinking of support, plotting of bending moment and shear force diagrams.

Continuous Beams:- Analysis of continuous beam by three moment (Clapyeron's theorem) up to three unknowns, effect of sinking of supports, plotting of bending moment and shear force.

Three Hinged Arch: - Concept of three hinged arch as a hunched beam, support reactions, B.M., S.F. and axial thrust diagrams for circular and parabolic three hinged arches.

Two Hinged Arches:- Horizontal thrust at supports. shear, normal thrust and BM at a point, BM diagrams for parabolic arch due to concentrated load and uniformly distributed load.

Influence Lines: - Influence line diagrams for reactions, bending moment and shear force for determinate beams. Rolling loads on simply supported beams, concentrated and uniformly distributed loads, maximum shear force and bending moment, absolute maximum shear force and bending moment

Text Books:
1. Basic structural analysis by C.S. Reddy. Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 3rd edition, 2011.
2. Theory of Structure, by S. Ramamruthum, Dhanpat Rai and Sons Publication.9th edition.

Reference Books:

1. Mechanics of structures Vol. – II by S. B. Junnarkar and Dr. H.J. Shah, Charotar Publishing House, 34th edition,2014.
2.. Indeterminate structures by C. K. Wang.Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 2014.
3.Theory of Structures ,Timoshenko S. P.; &Young D.H., International edition, McGraw Hill, 1965.

CE302 DESIGN OF RCC STRUCTURES

Teaching Scheme: 03L+ 00 T, Total: 03   **Credit**: 03
Evaluation Scheme: 15 ISE1 +15 ISE2 + 10 ISA + 60 ESE   **Total Marks**: 100
Duration of ESE: 04Hrs

Introduction: Introduction to various design philosophies of reinforced concrete structures, working stress method, ultimate load method, limit state method , limit state of collapse, limit state of serviceability, limit state of durability, characteristic strength, characteristic load, partial safety factors for material strengths and loads, structural properties of concrete.

Design for Flexure: Limit state method for flexure, assumptions, stress and strain diagram, balanced, under reinforced and over reinforced reinforced concrete sections, analysis and design of rectangular section. Analysis and design of doubly reinforced sections. Analysis and design of flanged sections.

Design for Shear, Torsion and Bond : Simply supported, cantilever beams and continuous beams using IS code coefficient method.

Design of Slabs: One way simply supported, cantilever slab and continuous slab. Two way simply supported and continuous slabs.

Design of Staircase: Design of dog legged stair case.

Column: Introduction, strain and stress variation diagrams, axially loaded short column with minimum eccentricity requirements, design of short column for axial load.

Footings:-Design of isolated pad footing for axial load and uniaxial bending.

Text Books
1) Limit State Design of Reinforced Concrete ,P. C. Varghese , , PHI, 2nd edition 2006
2) Limit State Theory and Design ,Dr. V. L. Shah and Dr. S. R ,. Karve, Pune Vidharthi Gruh
   Publication, Pune, 6th edition

Reference Books:
1) Design of Reinforced Concrete Structures (conforming to IS 456)S. Ramamrutham, R. Narayan ,
    Dhanpat Rai Publication, 7th edition 2013
2) Limit State Analysis and Design ,P. Dayaratnram, , Wheeler Publishing company, Delhi.,12th
   edition 2009
3) Reinforced Concrete Design ,Pillai Menon , Tata Mc Graw Hill, New Delhi., 3rd edition 2013

CE303 GEOTECHNICAL ENGINEERING

Teaching Scheme : 03L+ 00 T, Total: 03   **Credit:** 03
Evaluation Scheme: 15 ISE1 +15 ISE2 + 10 ISA + 60 ESE   **Total Marks:** 100
Duration of ESE : 03Hrs

Soil as Engineering. Material: Origin and formation of soil, geotechnical problems,volume-weight relationships, three phase system, definitions, functional relationships.

Geotechnical Properties: Index properties, engineering properties, Atterberg's limits, sieve analysis and its classification systems, and identification of soil.

Stresses in Soil: Geostatic stresses, Boussinesq's theory, point load, circular load,pressure bulb and its significance. Introduction to Westerguard's theory and Newmark's chart, stress strain relationship soil modulus, elastic settlement.

Soil Compaction and Stabilization: Methods of compaction, M.D.D. and O.M.C.,standard proctors test, heavy compaction test, Concept of stabilization and its methods.

Consolidation Theory: Terzaghi's theory, consolidation test, rate of settlements, Normal consolidated and over consolidated deposits, pre consolidation pressure.
Flow of Water Through Soils: Soil water, capillarity, Darcy's law, laboratory measurement of permeability, simple field measurement, flow net, its construction and uses, seepage force, quick sand, critical gradient.

Shear Resistance in Soil: Pore pressure and effective stresses failure theories, Mohr stress circle, Mohr's Coulomb's failure theory, law of shear strength.

Measurement of Shear Strength: Direct shear test, tri-axial test, unconfined compression test, vane shear test, factors affecting the shear strength, effect of drainage conditions.

Stability of slopes:- Finite and infinite slopes , natural and man made slopes, modes of failure, slip circle method, Swedish circle method, method of slices, critical height of slopes, stability number, landslides, remedial measures

Introduction to Earth Pressure: Introduction, Rankine's state of plastic equilibrium in soils, active and passive states due to wall movement, earth Pressure at rest.

Earth Pressure Determination: Rankine's theory- earth pressure on Retaining wall due to submerged backfill, backfill with uniform surcharge, backfill with sloping surface, layered backfill. Coulomb's Wedge theory, Rebhann's and Culmann's graphical method of determination of earth pressure.

Text Books
1) Soil Mechanics and Foundation Engineering ,K. R. Arora, Standard Publishers and Distributors,
   New Delhi, 7th edition, 2010.

2) Soil Mechanics and Foundation Engineering,V. N. S. Murthy, Saitech Publications, 1st edition
   2004 .

ReferencBooks

1) GeoTechnical Engineering, Gulhati and Datta ,Tata McGraw Hill, 4th edition, 2000 .

2) Soil Engineering in Theory and Practice (Vol.II), Dr. Alam Singh, CBS Publication Delhi, 2nd
   edition 2006.

3) GeoTechnical Engineering ,Ramamurthy T.N. and Sitharam T.G., S.CHAND publication, 5th
   edition.

4)Foundation Analysis and Design, J. E. Bowels, 5th edition, McGraw-Hill, 1996

CE304 ENVIRONMENT ENGINEERING-I

Teaching Scheme : 03L+ 00 T, Total: 03   **Credit**: 03
Evaluation Scheme: 15 ISE1 +15 ISE2 + 10 ISA + 60 ESE   **Total Marks**: 100
Duration of ESE : 03Hrs

Sources of Water: Surface water, ground water, infiltration galleries, relative suitability; intake structures, such as river intake, canal and reservoir intake, conveyance of raw water ,data collection for water supply scheme, components and layout ,design period ,factors affecting design period, hydraulic design of pumping station.

Demand of Water: Water demand for domestic purposes, fire demand, per capita demand, factors affecting consumption, fluctuation in demand. Design period for water supply components, population forecast, arithmetical increase, incremental increase, geometrical increase, and logistic curve methods

Water Quality: Impurities in water, physical, chemical and biological characteristics, water quality standards as per IS10500-1991,USEPA and WHO. Residual Chlorine, Fluoride, MPN, significance, water quality standards.

Water treatment processes: Flow diagram of conventional water treatment plant,
Aeration: Principle, Purpose, Design of cascade aerator;
Flash mixer: function, design, power requirement;
Flocculation: Coagulants, quantity of coagulants, design of mechanical flocculator, Design of Clariflocculator,
Sedimentation: General equation for settling of discrete particles, Plain settling tank, Tube settler, Design of settling tank, Surface over flow rate, Detention period; flow through velocity

Filtration: Objective, filter media, rapid and slow sand filters, number of filter units, rate of filtration, under drainage system, backwashing, negative head, operation and cleaning, design of slow and rapid sand filters, design of under drainage system, pressure filter.

Disinfection: Objectives, methods of disinfection, chlorination, free and combined chlorination, residual chlorine, effect of pH, bleaching powder, types of chlorination, pre-chlorination, post-chlorination, break point chlorination, super chlorination.

Tertiary Treatments: Softening, lime soda, quantity of lime and soda. Ion exchange, effect of fluoride, fluoridation and de-fluoridation. Demineralization methods like reverse osmosis,electro-dialysis, adsorption.

Text Book:-
1.Water Supply Engineering, by Garg S.K , Khanna Publisher, New Delhi thirteen edition 2015.
2.Water Supply and Sanitation Engineering, by G.S.Birdi and J.S.Birdi,Dhanpat Rai Publication Company, New Delhi Ninth edition 2012.

Reference Book :-

1.Water supply and Sewerage, by
E W Steel and Terence J McGhee, Tata McGraw Hill Publising
  Company   2.Physici-
chemical processes for water quality control, by Walter J Weber, Wiley Inter-science
  Publications 2012.

3.Water Supply Engineering   ,By   Punamia, Jain and Jain, Laxmi Publications, New Delhi first and
   second edition 2010.
5.Manual on Water Supply and Treatment, Central Public Health and Environmental
   Engineering, Organization, Ministry of Urban Affairs, Government of India.
6.Laboratory Manual for Chemical andBacteriological Analysis of Water and Sewage,by Therous,
   Eldridge and Mallmann, Agro Botanic Publisher, India.
7. Handbook of Technical Analysis , by Benergee and Jain Brothers New Delhi 2015.

CE305-FLUID MECHANICS-II

Teaching Scheme3L+ 00T, Total:03   **Credit**: 03
Evaluation Scheme: 15 ISE1 +15 ISE2 + 10 ISA + 60 ESE   **Total Marks**: 100
Duration of ESE: 03Hrs

Boundary Layer Theory: Concept of boundary layer, various thicknesses of boundary layer, applications of Von Karman momentum equation boundary layer over a flat plate, laminar and turbulent boundary layers,local and average
drag coefficients, separation of boundary layer and control of separation.
Fluid Flow Around Immersed Bodies: Practical problems involving   fluid flow around submerged objects, definitions and expressions of drag and lift, drag and lift coefficients, types of drags, drag on cylinder, circulation, magnus effect and lift on cylinder and airfoil, polar diagram.
Turbulence Flow Theory: Turbulence phenomenon, instantaneous and temporal mean velocities, Reynolds's expression for turbulent shear stress, introduction to Prandtl's mixing length theory,   Karman-Prandtl   equation ,   hydro-dynamically smooth and rough boundaries and mentions of equations for velocity distributions.DarcyWeisbach equation , only mention of different equations (no derivations)for friction factors for smooth, rough and transition boundaries, Moody's diagram.
Pipe Flow Systems: Major and minor losses, pipes in series and parallel and their equivalent pipes, siphon.
Open Channel flow:Classification of open channels, geometric elements,steady andunsteady, uniform and non uniform flows, continuity and energy equations, kinetic energy correction   factor.
Uniform Flow:
Chezy's and Manning's equations, concept of normal depth, calculation of normal depth for triangular and wide rectangular channels. Hydraulically efficient sections.
Critical Flow: Specific energy, specific energy diagrams, fundamental equation of critical flow, calculation of critical depth in rectangular and triangular channels.
Gradually Varied Flow: Types of non-uniform flows, differential equation of graduallyvaries flow (GVF) - alternate forms, introduction to different types of GVF profiles and practical examples of their occurrence,   control section;(no mathematical treatment for gradually varied flow).
Hydraulic Jump: Phenomenon of hydraulic jump, application of momentum equation to hydraulic jump in horizontal, frictionless, rectangular channel, specific force, conjugate deptsand relation between conjugate depths, energy loss in hydraulic jump, length of jump, classification and practical use of hydraulic jump.
Impact of jet: Impact of jet on stationary and moving, flat and curved plate using linear momentum principle, work done, Introduction to principle of angular momentum, mention of Euler's momentum equation for turbine and pumps .
Hydraulic Turbines: Elements of hydro electric power plant, unit and specific quantities, classification of hydraulic turbines, introduction to work done, heads and efficiencies of turbines.
Centrifugal Pumps: Classification of centrifugal pumps, specific speed, priming, introduction to
work done by impeller, heads and efficiencies. Characteristics of hydraulic turbine and centrifugal pump.

Text Books:

1. Hydraulics and Fluid Mechanics, Modi and S.M. Seth, Standard Book House, New Delhi.

2. Fluid Mechanics ,Dr. A. K. Jain, Khanna Publishers, Delhi, edition – 2011.

Reference Books:

1.Fluid Mechanics : Fundamentals and   Applications,John M. Cimbala, Yunus A. Cengel
, McGraw-Hill Higher Education, 2nd edition, 2010.

2.FM and HM-Problems and Solutions,Dr. K. Subramanya, , Tata cGraw-Hill   Education Pvt.
   Ltd. New Delhi, 6th reprint-2013.

3.Fluid Mechanics Streeter V.L. and Wylie E.B, Tata McGraw-Hill Education Pvt.,
   Ltd., New Delhi, 6th reprint - 2012.

4.Introduction to Fluid Mechanics and Fluid Machines,Som S K and Biswas G – ,
Tata McGraw-
   Hill Publishing Company Ltd., New Delhi.

CE306- DESIGN OF RCC STRUCTURES LAB

Teaching Scheme : 02P   **Credit**: 01
Evaluation Scheme: 25 ICA + 25 ESE   **Total Marks**: 50

Following assignments shall be performed to cover entire curriculum of course CE302

1) Design of beams and slabs and prepare detailed drawing of beams and slab.

2) Design of columns and footings and prepare detailed drawing of columns and footings

3) Design of staircase.

4) A report on at least one site visit shall be submitted in ICA

Detailed drawing of any two designs should be completed with AutoCAD software

- **ICA –** Internal Continuous Assessment shall support for regular performance of assignments and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student based on assignments completed by him/her. The performance shall be assessed experiment/assignment wise using internal continuous assessment format (S 10).
- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE307 - GEOTECHNICAL ENGINEERING   LAB

Teaching Scheme:02P,Total:02 **Credit :** 01

Evaluation Scheme: 25 ICA + 25 ESE **Total   Marks:** 50

Minimum Six experiments shall be performed to cover entire curriculum of course CE208.

1. Field density by core cutter method, sand replacement method.
2. Sieve analysis and particle size determination or hydrometer analysis.
3. Specific gravity determination by pycnometer method.
4. Determination   of liquid limit , plastic limit and shrinkage limit
5. Proctor's test (MDD / OMC)
6. Determination of co-efficient of permeability by constant head and falling head method.
7. Direct shear test
8. Triaxial test
9. Unconfined compression test
10. Vane shear test.
11. Consolidation test

- **ICA –** Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge acquired and record submitted by student based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).
- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE308 ENVIRONMENT ENGINEERING-LAB-I

Teaching Scheme : 02P **Credit**: 01
Evaluation Scheme: 25 ICA + 25 ESE **Total Marks**: 50

Minimum eight experiments shall be performed to cover entire curriculum of course CE304 from Group A and two from Group B
Group A:
1. Determination of P^H of given/collected water sample.
2. Determination of Hardness of given/collected water sample.
3. Determination of Chloride content of given/collected water sample.
4. Determination of Dissolve Oxygen(DO) of given/collected water sample.
5. Determination of Alkalinity of given/collected water sample.
6. Determination of Turbidity of given/collected water sample
7. Determination of Total solids of given/collected water sample.
8. Determination of Iron content of given/collected water sample.
9. Determination of Calcium content of given/collected water sample.
10. Determination of Residual chlorine of given/collected water sample.
11. Determination of Alum Dose for given/collected water sample.
12. Most probable number(MPN)Test

Group B:
1. Design of water treatment scheme for medium size township.
2. Design of water distribution scheme for medium size township.
3. A complete report on site visit to a Water Treatment Plant for Municipal purpose.

- **ICA** – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge acquired and record submitted by student based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format (S 10).
- **ESE** – The End Semester Exam for this course shall be based on oral examination/assignment etc to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE309 FLUID MECHANICS-II-LAB

Teaching Scheme: 02P, Total: 02   **Credit**: 01
Evaluation Scheme: 50 ICA   **Total Marks**: 50

Minimum Eight experiments shall be performed to cover entire curriculum of course CE305.

1. Study of boundary layer on a flat plate.
2. Measurement of drag and lift on airfoil and cylinder.
3. Determination and analysis of Pressure distribution over circular Cylinder.
4. Determination of friction factor in pipe flow.
5. Study of uniform flow formulae in open channel (Chezy's and Manning's formulae).
6. Study of specific energy and specific force in open channel flow.
7. Determination of velocity distribution in open channel flow.
8. Calibration of Venturiflume.
9. Measurement of different parameters of hydraulic jump in laboratory or on site.
10. Study of operation characteristics of Pelton wheel turbine.
11. Study of main characteristics of Kaplan turbine.
12. Study of operation characteristics of Francis turbine.
13. Study of performance of centrifugal pump.
14. Visit to any hydropower plant.

- **ICA** – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format **(S 10)**.

CE310 TESTING OF MATERIALS LAB

Teaching Scheme:01TH and 02P,Total:03   **Credit :** 02
Evaluation Scheme: 25 ICA+ 25ESE   **Total Marks:** 50

Concrete Mix Design by IS and IRC/Road Note No.4 Method, Concept and use of non destructive testing such as Ultrasonic pulse velocity, rebound hammer, half cell potential, carbonation depth, and core test etc.Study of Precast and Pre stressed Concrete – Precast concrete and its uses, introduction to Pre stressed concrete, types of pre stressing methods.Fiber Reinforced Concrete – Introduction, classification, mechanism, role of fiber size, and its application

Minimum Six experiments shall be performed
1) Concrete Mix Design (M15/M20/M25) by IS Method and compressive strength at 7days and 28   days.
2) Concrete Mix Design (M15/M20/M25) by IRC Method and compressive strength at 7days and 28 days.
3) Rebound hammer test on concrete.
4) Ultrasonic Pulse velocity test.
5) Determination of Modulus of Elasticity of Concrete by extensometer.
6) Effect of admixtures on concrete strength
7) Experimental investigation of effect of aggregate gradation and fineness on concrete properties.
8) Compressive strength of Paver blocks
9) Compressive strength of Solid/ Hollow blocks
10) Test on tor steel
 One site visit to Civil Engineering project related to above topics/experiments (Compulsory). .

- **ICA** – Internal Continuous Assessment shall support for regular performance of practical and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student (journal) based on practical performed by him/her. The performance shall be assessed experiment wise using internal continuous assessment format **(S 10)**.
- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

Reference Books:
1. Building and construction materials lab manual ,M L Gambhir, Neha Jamwal ,McGraw Hill Education (India) Pvt. Ltd,2013.
2. Civil Engineering Materials ,Parbin Singh, , S. K.Kataria and Sos New Delhi.
4. Building Materials ,S.K. Duggal, , New Age International Publishers.
5. Concrete Technology, M. S. Shetty, S Chand Publication,2013
6. Concrete Technology ,M. L. Gambhir, McGraw Hill Education (India) Private Limited,2013.

CE351 ADVANCED THEORY OF STRUCTURES

Teaching Scheme: 03L+ 00T, Total: 03   **Credit**: 03
Evaluation Scheme: 15 ISE1 +15 ISE2 + 10 ISA + 60 ESE   **Total Marks**: 100
Duration of ESE: 03Hrs

Basic Concepts of Structural Analysis: Types of skeletal structures, static and kinematics indeterminacy, equilibrium and compatibility conditions, stress-strain relations,force-displacent relations, concept of linear/non-
linear structures. Energy theorem, Muller Breslau principle, concept of complementary energy,fundamental concept of force and the displacement method of analysis.

Slope Deflection Method: Applied to continuous and rigid jointed frames, transverse and rotational yielding of supports.(up to three unknown),Sway and non-sway problems.

Moment Distribution Method: Applied to continuous beams and rigid jointed rectangular frames , transnational and rotational yielding of supports.

Approximate Analysis of Multistory Frames: Vertical and lateral loads, substitute frame, portal frame and cantilever method.

Fundamental Concept of Flexibility: Method for structural analysis, flexibility coefficient, matrixformulation for flexibility methods, degree of freedom. Influence coefficients, physical significance, choice of basic determinate structure and redundant forces, compatibility equations, effect of settlement and rotation of supports, temperature and lack of fit, hand
solution of simple problems on beams, pin jointed plane truss and rigid jointed frames (Up to three unknowns)

Fundamental Concept of Stiffness: Method of structural analysis, stiffness coefficient, matrix formulation for stiffness methods, degree of freedom. Influence coefficients, physical significance   effect of settlement and rotation of trusses and rigid jointed plane frames (Upto three unknown)

Plastic Analysis of Steel Structures : Introduction, shape factor, plastic hinge, collapse mechanism, upper bound and lower bound theories, application to continuous, fixed and single bay single storey rectangular frames.

Text Books:
1. Basic Structural Analysis, Reddy C. S., 3nd Edition Tata – McGraw Hill, New Delhi, 2012.
2. Theory of Structures, Stephen P. Timoshenko and D. H. Young, 2nd edition, McGraw-Hill, 1965.

Reference Books:
1. Structural Analysis ,Bavikatti S. S., New Age Publicatio.4th edition, 2013
2. Structural Analysis, Pandit and Gupta ,TataMcGrawHill,Pub. Co.Ltd ., New Delhi,2nd edition, 2008.

3. Intermediate Structural Analysis, Wang, C. K., 1st Edition, International Edition, McGraw Hill Inc, 2010.

CE352 DESIGN OF STEEL STRUCTURES

Teaching Scheme :03L+00T, Total: 03   **Credit:** 03
Evaluation Scheme:15 ISE1 +15 ISE2 + 10 ISA + 60 ESE   **Total Marks:** 100
Duration of ESE : 03Hrs

Design should be based on IS 800-2007
Introduction: Types of steel structures, grades of structural steel, various rolled steel sections, relevant IS specifications such as IS 800-2007, IS:808-1989, IS:875 part I to III and V, SP: 6(1), SP: 6(6), IS:4000-1992, codes for welded connections. Limit state method of design for strength and serviceability, partial safety factor for load and resistance, various design load combinations.

Types of Connections: Strength of bolted and welded connections, design of connections subjected to axial forces and moments, beam to beam and beam to column connection (framed connections)

Tension Member: Modes of failure, yielding of cross-section,rupture, block shear. Design of single and double angle sections with gusset plate with bolted and welded end connections.

Compression Member: Effective length, slenderness ratio, modes of failure, failure with full strength, local buckling, torsional buckling, classification of cross sections, buckling curves, design of compression members with bolted and welded connection using single and double angle sections.

Flexural Member: Laterally supported beams using single rolled steel section with and without flange plate, strength in flexure, low and high shear, check for deflection. Secondary and main beam arrangement for floor of a building, design of beam to beam and beam to column connections using bolt / weld, design of purlin. Design of compound beams.

Roof Truss: Design of members for dead load, live load and wind load, detailing of typical joints and supports.

Design of Built-up Column: Design of lacing, introduction to battened column, design of connections, column bases under axial load, gusseted base.

Design of Welded Plate Girder: Design of cross section, curtailment of flange plates, stiffeners and connections

Text Books
1.Design of Steel Structures ,Negi, B.S,Tata McGraw Hill India, 1995.
2. State Design of Steel Structures ,Duggal S. K.,Limit, Tata Mc Graw Hill publishing company Ltd., New Delhi, 3rd edition, 2009

Reference Books
1. Design of Steel Structure by Limit State Method as per IS: 800-2007Bhavikatti S. S , I K International Publishing House, New Delhi, 3rd edition
2. Design of Steel Structures ,Ram Chandra, Vol.I and Vol.II, Standard Book House, New Delhi, 10th edition, 2011

3. Design of Steel Structures ,Subramanian N, Oxford University Press, New Delhi, 2008

CE353 FOUNDATION ENGINEERING

Teaching Scheme :03L+00T, Total: 03   **Credit:** 03

Evaluation Scheme:15 ISE1 +15 ISE2 + 10 ISA + 60 ESE   **Total Marks:** 100

Duration of ESE : 03Hrs

Soil Exploration, Sampling and Testing: Subsurface exploration, trial pits, shafts and boring, geophysical tests, wash boring, representative and undisturbed samples, bore hole sampling, laboratory evaluation of foundation parameters, field testing, penetration tests, plate load test

Bearing Capacity: Definitions of ultimate bearing capacity, gross, net and safe pressures, allowable bearing pressure, load settlement curve, Terzaghi's bearing capacity analysis, bearing capacity equations for square and circular footings, factors influencing bearing capacity, performance of footings in different soils, local and general shear, effects of water table, bearing capacity of layered soils.

Elastic settlement: Elastic settlement, elastic stresses and strains, contact pressure, empirical relation for settlement of bases, total and differential settlement, tolerable settlement.

Shallow Foundations: Spread footings, minimum depth, plain and rcc footings, allowable soil pressure, use of SPT blow count, wall footings, column footings, combined footings, raft foundations, floating foundations, grillage foundations.(only derivations, no numerical)

Deep Foundation : Introduction to pile foundation, necessity of pile foundation, classification of piles, construction methods of bored piles, concrete bored piles, driven cast in-situ piles, pile capacity based on static analysis, dynamic methods and their limitations, in-situ penetration tests and pile load test as per IS:2911 specifications, negative skin friction, pile groups, ultimate load capacity of groups, under-reamed piles. introduction to piers , caissons and well

Machine Foundation: Mechanical vibrations, single degree freedom systems, free and forced vibrations, damped systems, natural frequency, resonance magnification, vibration parameters , vibration test, block foundation design Balkan method, isolation and control of vibration screen barriers.

Text Books

1) Soil Mechanics and Foundation Engineering, Dr. B.C.Punmia, Laxmi Publications,16th edition 2005.

2) Soil Mechanics and Foundation Engineering ,K. R. Arora, Standard Publishers and Distributors, New Delhi, 7th edition, 2010.

3) Soil Mechanics and Foundation Engineering,V. N. S. Murthy, Saitech Publications, 1st edition 2004 .

ReferencBooks

1) GeoTechnical Engineering, Gulhati and Datta ,Tata McGraw Hill, 4th edition, 2000 .

2) Soil Engineering in Theory and Practice (Vol.II), Dr. Alam Singh, CBS Publication Delhi, 2nd edition 2006.

3) Modern Geotechnical Engineering and Foundation, Dr. Alam Singh, CBS Publication, Delhi.

4) GeoTechnical Engineering ,Ramamurthy T.N. and Sitharam T.G., S.CHAND publication, 5th edition.

5)Relevant Indian Standard Specifications and Codes, BSI Publications, New Delhi.

CE354-ENVIRONMENT ENGINEERING-II

Teaching Scheme : 03L+00T:Total 03   **Credit**: 03
Evaluation Scheme: 15 ISE1 +15 ISE2 + 10 ISA + 60 ESE   **Total Marks**: 100
Duration of ESE : 03Hrs

Quantity of Sewage: Components of sewage, dry weather flow, peak factor, quantity of storm water, rational formula, ground water infiltration, variation in flow rates, population equivalence. Reactor flow regime-Batch reactor, continuous flow reactor, plug flow reactor, completely mixed flow reactor, kinetics of microbial degradation in batch reactor.

Quality of Sewage: Parameters of characterization, dissolved oxygen and its significance, biochemical oxygen demand, first stage BOD satisfaction and nitrification process chemical oxygen demand, total solids, different types of solids in water, Sampling of sewage. Pollution effects due to disposal of sewage on land, river, lake and sea ,river re-aeration.

Sewage Pumping: Difficulties in pumping, types of pumps used, their maintenance. Conveyance of sewage ,Quantity of domestic and storm sewage-assessment, sewer- terminologies, non-silting non-scouring velocity, coefficient of roughness, Manning's formulation, Chezy's formulation, ogee shaped sewer material, sewer appurtenances, forces acting on sewers, laying of sewer, maintenance of sewer. House plumbing

Sewage Treatment: Primary treatment, types and functions of screen chamber , design of grit chamber, function, velocity control, design of oil and grease tank, primary settling tank,surface over flow rate, weir loading, secondary treatment, trickling filters, standard rate, high rate, recirculation, efficiency, design of trickling filters, sludge disposal, activated sludge process.

Low Cost Waste: Treatments, unit operations and processes, grit chamber, oxidation ponds, facultative pond, oxidation ditch, aerated lagoon, septic tank, soak pits, dispersion trenches, problems on design of oxidation pond, oxidation ditch and septic tank. theory and design of aerated lagoons, anaerobic lagoons, rotating biological disk

Sources of Solid Waste: Municipal solid waste - bad effect, generation rates, effect of socio-economic on rate of generation, global and Indian scenario, storage- sizing of dust bin, collection, removal methods, transportation- assessment of vehicle requirement, concept of route optimization (no mathematical treatment), methods of disposal- land filling, composting, incineration, vermin-composting, sea disposal, application to public places like colleges, parks, cinema halls, auditoriums, hospitals, offices etc.

Air and Noise Pollution: Sources of air pollution, primary, secondary and tertiary, stationary and mobile sources, effect of air pollution on man, material, and plants, Bhopal gas tragedy, control of air pollution, settling chambers, electrostatic precipitators, cyclone separators, scrubbers, air quality standards, sources, measurement, decibel scale, computation of noise, effect, control measures, tolerance levels.

Text Book :-
1.Water Supply Engineering, by Garg S.K , Khanna Publisher, New Delhi thirteen edition 2015.
2.Water Supply and Sanitation Engineering, by G.S.Birdie and J.S.Birdi,Dhanpat Rai Publication
   Company, New Delhi, ninth edition 2012.
3.Wastewater Engineering ,by B C Punmia, Ashok Jain and Arun Kr Jain, Firewall Medium
   Publication, second edition 2010.

Reference Book :-

1.Water Supply and Sewerage, by E W Steel and Terence J McGhee, McGraw-Hill, 1991.
2.Air pollution, by M N Rao and S K S Rao, TMH publications 26th reprint 2007.
3.Environmental Engineering, by Pevy, Rowe and Tchobanoglous, McGraw Hill International,
   New Delhi,1985
4.Air Pollution, by Rao, M. N., and Rao, H. V. N., Tata McGraw Hill Publishing Company
   Limited, New Delhi, 1989.
5.Solid Waste Management in Developing Countries, by Bhide A. D. and Sundaresan B. B.,
   INSDOC, New Delhi, 1983.

CE355 CONSTRUCTION MANAGEMENT

Teaching Scheme : 03L+00T:Total 03   **Credit**: 03
Evaluation Scheme: 15 ISE1 +15 ISE2 + 10 ISA + 60 ESE   **Total Marks**: 100
Duration of ESE : 03Hrs

Construction Organization: Construction industry, construction team, construction activities, classification of construction, stages in construction, need of management in construction. Job layout and value engineering. Leadership and its quality, organization, meaning and function, forms of organization-line ,line and staff, functional, Type A, Type B and Type C

Network Technique and Resource Planning: History, advantages, bar charts, S –Curve etc. various terms used in network technique, activity, event, critical path, duration etc. Development of networks, network scheduling, to find various times and float, EST, EFT, TF etc Monitoring of Network, three phases of network technique. PERT/CPM: Critical path theory and application, bar chart, grant chart.

Cost Analysis: Cost analysis, cost curve, optimization and crashing of networks. Updating of network, during monitoring, resource levelling, allocation ,levelling and smoothening. Line of balance-Concept and uses.

Materials Management: Role and objectives of materials management, materials procurement and delivery, inventory control-EOQ techniques.

Engineering Economics: Engineering economics, its definition and importance, demand and supply, factors affecting demand and supply, cost concept. Bank, its type, uses and functions, banking systems, profit and loss account, appreciation and depreciation of money.

Construction Equipment: Excavating and hauling equipments, power shovels , size, basic parts , selection, factors affecting output. Draglines, types , size, basic parts. Bulldozers, types, moving earth with bulldozers. Clamshells–Clamshell buckets. Choice of equipment and standard production rates

Text Book :-

1) Construction planning and management, by Mahesh Varma , sixth edition,2002
2) Construction Management., by Gehlot and Dhir, second edition 1992 reprint 2002.
3) Construction Management , by U.K.Shrivastava , third edition 2005 reprint 2013.

Reference Book :-

1. Construction equipment and job planning, by S.V.Deodhar, Khanna publishers,fourth edition , 2012.
2. Construction Planning and Management, by Peurifoy, McGraw-Hill,2002
3. CPM and PERT, L.S.Srinath, PHI third edition,2012.
4. Engineering Economics, by Tarachand , fourteen edition, 2007

5. Principles of Construction Management, Roy Pilcher, McGraw-Hill, third edition, June 1992.

CE356 DESIGN OF STEEL STRUCTURES LAB

Teaching Scheme : 02P   **Credit**: 01
Evaluation Scheme: 25 ICA + 25 ESE   **Total Marks**: 50

Following assignments shall be performed to cover entire curriculum of course CE352.

1) Numerical on Riveted/bolted and Welded Connection

2) Design of Roof Truss
   a)Load analysis-dead load, live load, wind load as per IS: 875 part I to III
   b)Design of various components roof truss by IS 800:2007
   c) Detailing and drawing of roof truss.

3) Design of an Industrial Building
   a) Analysis of industrial building: Calculations of member forces.
   b) Design of main beam and secondary beams, connections, columns, column bases.
   c) Detailing and drawing of various components of industrial building.

4) Design of Welded Plate Girder
   a) Analysis of welded plate girder- Calculation of maximum shear force and maximum bending
      moment.
   b) Design of web plate for shear, design of flange plate for bending moment,design of web
      stiffeners, design of intermediate stiffeners, design of bearing stiffeners, curtailment of
   flange
      plate

5) A report on at least one site visit.(Compulsory)

- **ICA –** Internal Continuous Assessment shall support for regular performance of assignments
  and its regular assessment. In addition; it shall be based on knowledge/skill acquired and
  record submitted by student based on assignments completed by him/her. The performance
  shall be assessed assignment wise using internal continuous assessment format (S 10).

- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge
  the skills acquired by student. It shall be evaluated by two examiners out of which one
  examiner shall be out of institute.

CE357 FOUNDATION ENGINEERING LAB

Teaching Scheme : 02P   **Credit**: 01
Evaluation Scheme: 50 ICA   **Total Marks**: 50

A)Minimum Four assignments shall be performed to cover entire curriculum of course CE208.

1. Preparation of Soil investigation report based on given data.
2. Problems on Plate Load Test, Standard Penetration Test and corrections.
3. Bearing capacity calculations for different foundation.
4. Settlement analysis.
5. Design of pile foundations.
6. Design of under reamed pile.

B) Demonstration of any one of following tests;

1. Plate load test.
2. Standard penetration test.
3. Swelling pressure test.

- **ICA –** Internal Continuous Assessment shall support for regular performance of assignments and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student based on assignments completed by him/her. The performance shall be assessed assignment wise using internal continuous assessment format (S 10).

CE358 ENVIRONMENT ENGINEERING LAB-II

Teaching Scheme : 02P   **Credit**: 01
Evaluation Scheme: 25 ICA + 25 ESE   **Total Marks**: 50

Minimum eight experiments shall be performed to cover entire curriculum of course CE354,five from Group A, two from Group B and Group C compulsory
Group A:
1. Determination of Chloride content of wastewater sample.
2. Determination of Sulphate content of wastewater sample.
3. Determination of DO content of water and wastewater sample.
4. Determination of BOD of wastewater sample.
5. Determination of COD of wastewater sample.
6. Determination of total dissolved solids and suspended solids content of wastewater sample.
7. Determination of Conductivity of water for given/collected waste water sample.
8. Determination of oil and grease content of waste water sample.
9. Determination of Sludge Volume Index of wastewater sample from aeration tank.
10. Determination of Nitrates content of wastewater sample by using spectrophotometer.

Group B:
1. Design of screen chamber
2. Design of grit chamber
3. Design of conventional Activated Sludge Process.
4. Design of trickling filters
5. Design of sludge digestion tank
6. Design of septic tank with soak pits

Group C:
Visit to Sewage Treatment Plant/Waste Water Treatment Plant: Visit report shall be in brief consisting of layout of plant, necessity of units, design details such as: flow, size etc. along with cross-section of each unit.

- **ICA –** Internal Continuous Assessment shall support for regular performance of practical/assignments and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student based on practical/assignments performed/completed by him/her. The performance shall be assessed experiment/assignment wise using internal continuous assessment format (S 10).
- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE359 SOFTWARES IN CIVIL ENGINEERING LAB

Teaching Scheme : 02P   **Credit**: 01
Evaluation Scheme: 25 ICA + 25 ESE   **Total Marks**: 50

Group A
 Analysis and design of structure using any one software listed below or otherwise i) STAAD Pro ii) STRUDS, iii) SAP-2000 iv) ETABS v) ANSYS vi) Build master
Group B:
Group B – Solution of problems in any TWO different areas using software listed below or otherwise
i) Geotechnical Engineering : GEO5/ OYASYS Slope - 2D slope stability analysis/ MIDAS GTS
ii) Estimating and Surveying- QE-Pro,
iii) AutoCivil
iv) Project Management Software: Mircosoft Project 2010/ PRIMA VERA/Contractor
v) Transportation Engineering: Road Master
vi) Remote Sensing and GIS: ArcGIS/GEOMATICA/ERDAS
vii) Environmental Engineering: Neuro Solution
viii) Fluid Mechanics: Flowmaster

 A Lab Report based on above experiments shall be submitted by each student

- **ICA –** Internal Continuous Assessment shall support for regular performance of assignments and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by student based on assignments performed/completed by him/her. The performance shall be assessed assignment wise using internal continuous assessment format (S 10).
- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

CE359 MINOR PROJECT

Teaching Scheme : 02P **Credit**: 02
Evaluation Scheme: 25 ICA + 25 ESE **Total Marks**: 50

1.Every student shall undertake the Minor Project in semester VI. It is expected that the broad area of major project shall be finalized by the student in the beginning of the VI semester and Minor project undertaken may be a part of Major Project

2 Each student shall work on an approved project, a group of 05 students (maximum) shall be allotted for the each minor project and same group may be continued for major project

3 Minor project may involve fabrication, design or investigation of a technical problem that may take design, experimental or analytical character or combine element of these areas. The project work shall involve sufficient work so that students get acquainted with different aspects of Surveying, fabrication, design or analysis

4 Each group of students is required to maintain separate log book for documenting various activities of minor project

Guide lines for ICA: Assessment of the project for award of ICA marks
Shall be done jointly by the guide and departmental committee as per the guidelines given in Table-A.
Assessment of Mini Project
Name of the Project: _____
Name of the Guide: _____
Table-A

SN	Name of Student	Project Selection	Docume ntation	Design /Simula tion/Lo gic	Result Verifica tion	Presenta tion	Total
		05	05	05	05	05	25

- **ESE –** The End Semester Exam for this course shall be based on oral examination to judge the skills acquired by student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.