List of Courses Focus on Employability/ Entrepreneurship/ Skill Development

Department : *Civil Engineering*

Programme Name : *B.Tech.*

Academic Year : 2019-20

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	CE03TBS05	ENGINEERING MATHEMATICS-III
02.	CE03TPC01	STRENGTH OF MATERIALS
03.	CE03TPC02	FLUID MECHANICS-I
04.	CE03TPC03	BUILDING MATERIALS & CONSTRUCTION
05.	CE03TPC04	SURVEYING & GEOMATICS
06.	CE03PPC01	SURVEY LAB
07.	CE03PPC02	FLUID MECHANICS LAB
08.	CE03PES06	COMPUTER AIDED CIVIL ENGG. DRAWING
09.	CE04THS04	ENGINEERING ECONOMICS
10.	CE04TPC05	CONCRETE TECHNOLOGY
11.	CE04THS05	PROFESSIONAL PRACTICE, LAW & ETHICS
12.	CE04TPC06	STRUCTURAL ANALYSIS-I
13.	CE04TPC07	FLUID MECHANICS-II
14.	CE04THS06	EFFECTIVE TECHNICAL COMMUNICATION
15.	CE04PHS01	EFFECTIVE TECHNICAL COMMUNICATION LAB
16.	CE04PPC03	MATERIAL TESTING LAB
17.	CE5TPC07	DESIGN OF CONCRETE STRUCTURES
18.	CE5TPC08	STRUCTURAL ANALYSIS - II
19.	CE5TPC09	HIGHWAY ENGINEERING
20.	CE5TPC10	ESTIMATION AND COSTING
21.	CE5TPC11	GEOTECHNICAL ENGINEERING - I
22.	CE5TPC12	ENVIRONMENTAL ENGINEERING - I
23.	CE5LPC04	HIGHWAY ENGINEERING LAB
24.	CE5LPC05	ENVIRONMENTAL ENGINEERING LAB
25.	CE6TPC13	WATER RESOURCES ENGINEERING-I
26.	CE6TPC14	ENVIRONMENTAL ENGINEERING - II
27.	CE6TPC15	DESIGN OF STEEL STRUCTURES
28.	CE6TPC16	GEOTECHNICAL ENGINEERING- II

29.	CE6TPE1A	ADVANCED CONCRETE TECHNOLOGY
30.	CE6TPE1C	ADVANCED CONCRETE DESIGN
31.	CE6TOE1A	CONSTRUCTION PLANNING & MANAGEMENT
32.	CE6LPC05	GEOTECHNICAL ENGINEERING- LAB
33.	CE6LPC06	COMPUTER APPLICATION IN CIVIL ENGG. LAB
34.	CE7TPC17	WATER RESOURCES ENGINEERING-II
35.	CE7TPE2A	DESIGN OF PRESTRESSED CONCRETE
36.	CE7TPE4A	GROUND WATER HYDROLOGY
37.	CE7TPE5C	RAILWAY ENGINEERING
38.	CE7TOE2D	QUALITY CONTROL ASSURANCE AND SAFETY IN
39.	CE7LPS01	SEMINAR
40.	CE7LPS02	MINOR PROJECT
41.	CE8TPC18	EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
42.	CE8TPE6D	SOLID AND HAZARDOUS WASTE MANAGEMENT
43.	CE8TPE7A	AIR AND WATER TRANSPORTATION
44.	CE8TOE3A	MANAGEMENT INFORMATION SYSTEM
45.	CE8LPS03	MAJOR PROJECT
46.	CE8LPC07	STRUCTURAL DETAILING LAB

Scheme and Syllabus

CIVIL ENGINEERING DEPARTMENT, SOS, ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA (A CENTRAL UNIVERSITY), BILASPUR

SCHEME OF B.TECH. III SEMESTER CIVIL ENGINEERING
W.E.F. 2019-20 (ODD SEMESTER)

S. No	Subject Code	Subjects	Period/Week			Scheme of Evaluation				Grand Total	Credits
						Internal Assessment (IA)			ESE		
		Theory	L	T	P	CT-I	CT-II	Total			
1	CE03TBS05	Engineering Mathematics-III	3	1	0	15	15	30	70	100	4
2	CE03TPC01	Strength of Materials	3	1	0	15	15	30	70	100	4
3	CE03TPC02	Fluid Mechanics-I	3	0	0	15	15	30	70	100	3
4	CE03TPC03	Building Materials &Construction	3	0	0	15	15	30	70	100	3
5	CE03TPC04	Surveying & Geomatics	3	0	0	15	15	30	70	100	3
6	CE03THS03	Indian Constitution*	2	0	0	-	-	-	-	-	0
		Practical									
1	CE03PPC01	Survey Lab	0	0	3	-	-	30	20	50	1.5
2	CE03PPC02	Fluid Mechanics Lab	0	0	3	-	-	30	20	50	1.5
3	CE03PES06	Computer Aided Civil Engg. Drawing	0	0	3	-	-	30	20	50	1.5
										Total Credits	21.5
L - Lecture Hours, T-Tutorial Hours, P - Practical Hours, CT - Class Test, ESE – End Semester Exam; * Mandatory Course											

CIVIL ENGINEERING DEPARTMENT, SOS, ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA (A CENTRAL UNIVERSITY), BILASPUR

SCHEME OF B.TECH. IV SEMESTER CIVIL ENGINEERING
W.E.F. 2019-20 (EVEN SEMESTER)

S. No	Subject Code	Subjects	period/Week			Scheme of Evaluation				Grand Total	Credits
						Internal Assessment (IA)			ESE		
		Theory	L	T	P	CT-I	CT-II	Total			
1	CE04THS04	Engineering Economics	3	0	0	15	15	30	70	100	3
2	CE04TPC05	Concrete Technology	3	0	0	15	15	30	70	100	3
3	CE04THS05	Professional Practice, Law & Ethics	2	0	0	15	15	30	70	100	2
4	CE04TPC06	Structural Analysis-I	3	1	0	15	15	30	70	100	4
5	CE04TPC07	Fluid Mechanics-II	3	0	0	15	15	30	70	100	3
6	CE04THS06	Effective Technical Communication	3	0	0	15	15	30	70	100	3
		Practical									
1	CE04PHS01	Effective Technical communication lab	0	0	2	-	-	30	20	50	1
2	CE04PPC03	Material Testing Lab	0	0	3	-	-	30	20	50	1.5
										Total Credits	20.5
L - Lecture Hours, T-Tutorial Hours, P - Practical Hours, CT - Class Test, ESE – End Semester Exam;											

DEPARTMENT OF CIVIL ENGINEERING B.TECH. SECOND YEAR SYLLABUS W.E.F 2019-20

SYLLAUS	(SEMESTER-III)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE03TBS05	L	T	P	CT-1	CT-II	TOTAL	70	100	4
Subject:	Engineering Mathematics-III	3	1	0	15	15	30			

Course Learning Objectives:

Course Learning Objectives:

The students will be able to use of the concepts of correlation, Regression and various types of distributions. To provide students with the skills, knowledge and attitudes required to determine approximate numerical solutions to mathematical problems which cannot always be solved by conventional analytical techniques, and to demonstrate the importance of selecting the right numerical technique for a particular application, and carefully analysing and interpreting the results obtained.

Course Content:

UNIT-1 Correlation & Regression: Scatter diagram, Linear Correlation, Measures of Correlation. Karl Pearson's Coefficient of correlation, Limits for correlation coefficients, Coefficient of correlation for vicariate frequency distribution, Rank correlation, Linear Regression, Equations to the line of Regression. Regression coefficient. Angle between two lines of Regression.

UNIT–2 Theoretical Distributions: Discrete and Continuous probability distribution's .Mathematical expectation, Mean and Variance, Moments, Moments generating function, probability distribution ,Binomial, Poisson and Normal distribution ,Test of significance based on chi-square , T,F, and Z distribution, degree of freedom , conditions for applying X2 (chi-square) test , student's test.

UNIT-3 Introduction of Errors and their Analysis, types of errors, numerical problems on error analysis, curve fitting: method of least squares; Numerical Solution of Algebraic and Transcendental Equations: Graphical method bisection Method, Secant Method, Regula-falsi Method, Newton Raphson Method.

UNIT- 4 The Calculus of Finite Differences: Finite differences, Difference formula, operators and relation between operators. Inverse Operator, Interpolation with equal intervals: - Newton's forward and backward interpolation formula. Interpolation with Unequal intervals: - Lagrange's interpolation Newton's difference formula, inverse interpolation.

UNIT- 5 Numerical Differentiation and Integration: - Numerical Differentiation Newton's forward and Backward difference interpolation formula. Maxima and Minima of a Tabulated function, Numerical Integration :-Trapezoidol rule, simpson's (1/3) rd and (3/8) th rule, Boole's rule, weddle rule.

Text Books:

1) Prasad C "Advanced Engineering mathematics",
3) Dass H.K. "Advanced Engineering mathematics",
4) Ray M. "Mathematics statistics",
5) HigherEngg. Mathematics by Dr. B.S. Grewal– KhannaPublishers.,
6) Advanced Engg. Mathematics by Erwin Kreyszig – John Wiley & Sons,
7) Advanced Engg.Mathematics by R.K. Jain and S.R.K. Iyengar – Narosa Publishing House.,
8) Applied Mathematics by P.N.Wartikar& J.N. Wartikar. Vol- II– Pune VidyarthiGrihaPrakashan,Pune.,
9) JAIN & IYNGAR Numerical Methods for Scientific and Engineering Computations.

10) RAO G.S. Numerical Anlysis.
11) Grewal B S Numerical Methods In Engineering and Science.
12) Rajaraman V Computer Oriented Numerical Methods
13) P. Kandasamy K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
14) S. S. Sastry, Introduction methods of Numerical Analysis, PHI, 4th Edition, 2005.

Course Outcomes-

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

- Understand the statistical concept of correlation regression and distribution, theory with special reforms to engineering problems.
- Analyse the errors obtained in the numerical solution of problems.
- Using appropriate numerical methods, determine the solutions to given non-linear equations.
- Using appropriate numerical methods, determine approximate solutions to systems of linear equations.
- Using appropriate numerical methods, determine approximate solutions to ordinary differential equations.

SYLLAUS	(SEMESTER-III)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE03TPC01	L	T	P	CT-1	CT-II	TOTAL	70	100	04
Subject:	Strength of Materials	3	1	0	15	15	30			

Course Learning Objectives:

The objective of this Course is to

- To determine the Mechanical behavior of the body by determining the stresses, strains produced by the application of load.
- To apply the fundamentals of simple stresses and strains.
- To facilitate the concept of bending and its theoretical analysis.
- To apply fundamental concepts related to deformation, moment of inertia, load carrying capacity, shear forces, bending moments, torsional moments, column, principal stresses and strains.

Course Content:

UNIT-1: Simple Stresses -Strain and compound stresses: Types of stresses and strains, Mechanicals properties, Hooke's law, stress– strain curve for mild & Cast iron, hardness, impact strength, Poisson's ratio, Relation between the elastic moduli & Poisson's ratio, Bars subjected to varying loads, Temperature stresses in composite bars, Elongation of bars of constant and varying sections. Stress at a point. Components of stress in rectangular coordinates, stresses on an inclined plane, Principal stresses & principle plane, Mohr's circle of stresses.

UNIT-2: Shear Force - Bending Moment: Shear Force & Bending Moment diagrams in statically determinate beams loaded with different load combination, Relationship between Load intensity- Shear Force - Bending Moment, Thrust diagram, Point of contra flexure, loading diagram & Bending moment diagram from shear force diagram, beam with internal hinge. Bending Stress

UNIT-3: Shear Stresses in Beams Derivation of Shear Stress formula, assumptions, and Shear stresses in symmetrical elastic beam with different sections.
Slope and Deflections of simple Beams: Derivation of differential equation for deflection, Slope & Deflection of Beams by Double integration method, Macaulay's method & Moment area method.

UNIT -4: Torsion: Equation of Pure Torsion, Assumptions, and Power transmitted, Stiffness of Shafts, Comparison of Solid & Hollow shaft, Strain energy in Torsion.
Columns: Stable and unstable equilibrium, Short columns, Euler's formula for long columns, Equivalent length, Limitation of Euler's formula, Rankine's formula.

UNIT -5: Thin-walled pressure vessels: Cylindrical pressure vessels, Spherical vessels. Thick Cylindrical vessels: Lame's theory, Graphical method for determining stresses Spherical shells.

Text Books:
1. Strength of Materials – R.K. Rajput (S. Chand & Co.)
2. Mechanics of Structures (Vol. – I) – Junarkar (Charotar Publications)
3. Strength of Materials – Timoshenko, S. & Gere (CBS Publishers)
4. Introductions to Solid Mechanics –Shames & Pitarresi (Prentice Hall of India)
5. Engineering Mechanics of Solid – Popov (Pearson Publication)
6. Strength of Materials–S. Ramamurtham (DhanpatRai Publications)
7. Strength of Materials (Part-I) – Timoshenko (CBS Pubishers)

Course Outcomes- At the end of the course the students will be able
- Describe the concepts and principles of stress and strain, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations of stress and strain due to axial load and temperature.
- To calculate the stresses on an inclined plane, principle stresses and also using Mohr's circle
- To analyse the determinate beams for internal stress resultants (SF, BM and AF) and plot the shear force and bending moment diagrams
- Analyse various situations involving structural members subjected to bending, shear and torsion.
- Calculate the deflection at any point on a beam subjected to a combination of loads.
- Differentiate the types of columns and their analysis
- Analyse the stresses in thin and thick shells

SYLLAUS	(SEMESTER-III)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE03TPC02	L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject:	Fluid Mechanics- I	3	0	0	15	15	30			

Course Learning Objectives:

- To understand the basic fluid properties and its buoyancy characteristics.
- To understand the kinematics of fluid.
- To learn the dynamics of fluid and discharge and velocity measuring equipment.
- To learn the characteristics of fluid in pipes and its losses.
- To learn the discharge measurement in open channel and pipes.

Course Content:

UNIT-1: Introduction: Fluid, physical properties of fluids ideal and real fluid, Newtonian a Newtonian Fluid Statics: Pressure density height relationship, pressure measurement by Mar Pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and bodies, metacentric height.

UNIT-2: Kinematics of fluid flow : Steady and unsteady flow, uniform and non-uniform flow, lam turbulent flow, one, two and three dimensional flow, streamlines and path lines, rotational and irr flow, continuity equation, three dimensional continuity equation. Velocity potential and stream functi

UNIT-3: Dynamics of fluid flow: Euler's equation of motion along a streamline and its int Bernoulli's equation and its applications – Pitot tube, Venturimeter, orificemeter, and problems r application of momentum equations.

UNIT-4: Flow in Pipes: Major and minor losses in pipe lines, loss due to sudden contraction & ex Pipes in series and parallel Flow in open Channel: Comparison between open channel and pi definition of uniform and non-uniform flow, Chezy's and Manning's Formula, Hydraulically efficien section of rectangular, trapezoidal.

UNIT -5: Flow through mouthpieces and orifices: Hydraulic coefficients of orifice, flow throu rectangular orifice, mouthpieces, Borda's mouthpieces. Notches and Weirs: Rectangular, triang trapezoidal notches and weir, cippoletti and broad crested weir.

Name of Text Books:

1. Fluid Mechanics and Machines – Dr. A.K. Jain (Khanna Publications)
2. Fluid Mechanics and Machines – Dr. R.K. Bansal (Laxmi Publications)
3. Fluid Mechanics & Hydraulic Machines – Dr.P.N.Modi & S.M.Seth, (Narosa Publishing House)

Name of Reference Books:

1. Mechanics of Fluid – Irving H. Shames (McGraw Hill)
2. Introduction to Fluid Mechanics – James A. Fay (Prentice Hall India)
3. Fluid Mechanics – R.J. Garde (New Age International Publication)
4. Fluid Mechanics – Streeter V.L. & Wylie E.B. (Tata McGraw Hills)
5. Fluid Mechanics – John F Dougles (Pearson Publication)
6. Introduction to Fluid Mechanics Fox, R.W. and Mc Donald, A.T., John Wiley & Sons.
7. Fluid Mechanics", Streeter, V.L. and Benjamin, W.E., "McGraw-Hill.
8. Fluid Mechanics and Fluid Mechanics Som, S.K. and Biswas, G., Tata McGraw Hill.
9. Introduction to Fluid Mechanics, Fox, R. W. and A. T. McDonald, 6th ed., John Wiley, New York,

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

- To understand the broad principles of fluid statics, kinematics and dynamics
- To understand definitions of the basic terms used in fluid mechanics
- To apply the discharge measurement methods in open channel and pipes.

DEPARTMENT OF CIVIL ENGINEERING B.TECH. SECOND YEAR SYLLABUS W.E.F 2019-20

SYLLAUS	(SEMESTER-III)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE03TPC03	L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject:	Building Materials & Construction	3	0	0	15	15	30			

Course Learning Objectives:

- To introduce the basic engineering properties of building materials like brick, stones, timber, ceramics, plastics, etc.
- To understand the elementary characteristics of construction materials like cement aggregates, concrete, steel, etc.
- To understand the types of foundations, functions, types of masonry, lintels, etc.
- To learn the structure supporting method like Shoring, Underpinning, and other advanced construction materials & Techniques.

Course Content:

UNIT- 1: Stones, Bricks, Tiles, Timber; Properties, Classification &Uses
UNIT-2: Miscellaneous Engineering Materials; Ceramics & glass; Plastics & Rubber; Paints, Varnishes and distempers; Composite materials; Adhesives; Thermal, Electrical & Sound Insulators.
UNIT 3: Cement, Aggregate, Concrete and Steel; classification, properties & uses.
UNIT-4: Foundations, Masonry, Arches & Lintels; Classification, Requirements & Uses.
UNIT-5: Shoring, Underpinning, Formwork, Advanced construction materials & Techniques.

Name of Text Books:

1. Building Materials – S.K. Duggal (New Age Publication)
2. Building Materials – S. C. Rangwala (Charotar Publication)
3. Building Construction by S.G. Rangwala, Charter Publishing House, Anand, India.
4. Building Construction by Sushil Kumar, Standard Publ. and Distributors, New Delhi
5. Building Construction by Punmia B.C., Lakshmi Publications, New Delhi.
6. Advanced Building Materials and Construction by Mohan Rai and Jai Sing, CBRI Publications, Roorkee
7. Concrete Technology – A.M. Neville & J.J. Brooks (Pearson Education)
8. Concrete Technology – M.S. Shetty (S. Chand & Co.)
9. Engineering Materials – Surendra Singh (Laxmi Publication)
10. Construction Engineering and Management – S. Seetharaman (UmeshPublication)
11. Building Materials – Gurucharan Singh (Standard Publishers, Delhi

Course Outcomes- At the end of the course students will be able

- To compare the properties of most common and advanced building materials.
- To understand the typical and potential applications of these materials
- To select the appropriate building material for building construction
- To identify the different components of a building and differentiate various types of foundations, masonry, arches and lintels
- To select the appropriate supporting structure for strengthening of the building

SYLLAUS	(SEMESTER-III)	Periods / Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE03TPC04	L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject:	Surveying & Geomatics	3	0	0	15	15	30			

Course Learning Objectives:

- To understand the basic principles of surveying of linear & elevated measurements i.e. chain survey, levelling etc.
- To expertise in surveying instrument like Compasses, theodolite & Total station etc.
- To learn the subsidiary surveying like photographic & hydrographic surveying
- To learn the advanced application of surveying like Remote sensing, EDM

Course Content:

Unit 1: Introduction to Surveying : Definition - Principles - Classification - Scales - Ranging and chaining - Reciprocal ranging .COMPASS SURVEYING: Prismatic compass - Surveyor's compass - Bearing - Systems and conversions - Local attraction – Magnetic declination - Dip .
LEVELLING: Principle of levelling, Different methods of determining elevations. Temporary and permanent adjustment of levels. Sensitivity of bubble tube, Levelling staff, Types of levelling: - Reciprocal, Profile, Differential, Plotting of profiles Correction: - Curvature and refraction.

Unit 2: Theodolite and Traversing: Vernier theodolites, Temporary and permanent adjustments, Requirements of nonadjustable parts, Measurement of horizontal angle by repetition and reiteration method, Measurement of vertical angles.
TACHEOMETERY: Definitions, Principles of stadia systems. Instrument constants, Substance and Tangential Systems. Construction and use of Reduction Tacheometers.
CONTOURING: Introduction to contouring.

Unit 3:.Triangulation: Principle and classification of Triangulation System, Strength of Figures, Station marks and Signals, Satellite station, intersected and Resected points.

Plane Table Surveying: Principles, Advantages and disadvantages, Plane table equipment, Use of Telescopic Alidade, Different methods of Plane Table Surveying.

Unit 4: PHOTOGRAPHIC SURVEYING: Photo theodolite, principle of the method of terrestrial photogrammetry, scale and distortion of the vertical and tilted photograph. HYDROGRAPHIC SURVEYING: Introduction, shore line survey, soundings methods

Unit 5: (A) Principle of Electronic Distance Measurement: Principle, Type, Use ,Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories – Advantages and Applications.
(B) Remote Sensing: Introduction –Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors.

Text/Reference Books:
1 Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.
2 Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
3 Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010

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

- To apply the knowledge, techniques, basics, and instruments of the discipline to engineering and surveying activities
- Explain different methods and their procedure for levelling
- Explain the working principles of various surveying instruments
- To relate the knowledge on Surveying to the new frontiers of science like Hydrographic surveying, Electronic Distance Measurement, Global Positioning System, Photogrammetry and Remote Sensing.

SYLLAUS	(SEMESTER-III)	CREDITS: 3			INTERNAL ASSESSMENT (IA)			ESE
Subject Code:	CE03PPC01	L	T	P	IA	MSE	TOTAL	
Subject:	Surveying Lab	0	0	3	30	-	30	20

Course Learning Objectives:

The Lab sessions would help in learning:

- Application of chains & compass in surveying.
- Various Applications of levelling process.
- Use of Plane table surveying in preparing of maps of a location
- Tacheometery & its Application.
- Relative adjustment of non- accessible stations
- Principle & operation of Total Station.

Course Content:

List of experiments

1. Linear measurement, offsetting & Determination of the area of the given field by cross staff survey & metric chain.
2. Compass open & closed traversing using prismatic compass and elimination of local attraction.
3. To find the difference in elevation between the two non-invisible stations by the method of differential levelling.
4. To draw longitudinal & cross-sectional profile of the road by the method of profile levelling.
5. Measurement of horizontal angle by repetition & reiteration method.
6. Traversing of the given area by radiation & intersection method using plane table survey.
7. Find the plane table instrument station using Resection method (Two point problem & three point problem)
8. Determination of Tacheometric constants (K & C).
9. Determination of elevation and height by tangential method when both angles are angles of elevation.
10. Determination of elevation and distance when line of sight inclined Upward & Downward
11. To perform the experiment for reduction to center from different positions of a satellite station when: (i) Satellite station in north position, (ii) Satellite station in left position
12. To perform the experiment for reduction to centre from different positions of a satellite station when: (i) Satellite station in south position, (ii) Satellite station in right position
13. Study of total station

Text Book:

1. Surveying and Leveling. N.N.Basak, 1st Edition, Tata McGraw Hill
2. Surveying (Vol. I & II) – Punmia, B.C. (Laxmi Publications, New Delhi, 1996)
3. Surveying (Vol. I & II) – Kanetkar (Pune VidyarthiGrihaPrakashan, Pune)

Name of Reference Books:

1. Surveying (Vol. II & III) – Agor, R (Khanna publications, Delhi, 1995)
2. Surveying (Vol. II & III) – Arora, K.R. (Standard Book House, Delhi, 1993)
3. Fundamentals of Surveying – S.K. Roy (Prentice Hall of India)
4. Surveying (Vol. I & II) – S.K. Duggal (Tata McGraw Hill)

Course Outcomes- On completion of the course, the students will be able to:

- Use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil engineering applications such as structural plotting and highway profiling.
- Apply the procedures involved in field work and to work as a surveying team.
- Plan a survey appropriately with the skill to understand the surroundings.

- Take accurate measurements, field booking, plotting and adjustment of errors can be understood.

SYLLAUS	(SEMESTER-III)	CREDITS: 3			INTERNAL ASSESSMENT (IA)			ESE
Subject Code:	CE03PPC02	L	T	P	IA	MSE	TOTAL	
Subject:	Fluid Mechanics Lab	0	0	3	30	-	30	20

Course Learning Objectives:

- To learn the calibration of discharge measuring, velocity measuring devices in pipes and an open channels.
- To learn the calculation of losses in pipe flow.
- To understand the verification of bernoulli's equation.

Course Content:

List of experiments

1. To calculate the total energy at different points and plot the graph between total energy vs. distance. (Verification of Bernoulli's equation)
2. To determine the Meta centric height with angle of ship model.
3. To determine the co-efficient of Discharge Cd for Venturimeter
4. To determine the co-efficient of Discharge Cd for Orificemeter.
5. To determine the co-efficient of discharge and the co-efficient of velocity for Orifice.
6. To determine the co-efficient of discharge and the co-efficient of velocity for Mouthpiece.
7. To determine the coefficient of discharge Cd of Rectangular Notch.
8. To determine the coefficient of discharge Cd V Notch - 45^0
9. To determine the coefficient of discharge Cd V Notch - 60^0
10. To determine the friction factor for Darcy-Weisbach equation
11. Experimental determination of critical velocity in pipe.
12. To determine the coefficient of impact for vanes
13. To find the co-efficient of pitot tube
14. To plot velocity profile across the cross section of pipe
15. To determine the Reynold's Number in pipe
16. Calibration of rectangular sharp cornered weir and to study the pressure distribution on the upstream face of the weir.
17. Calibration of rectangular streamlined weir and to study the pressure distribution on the upstream face of the weir.

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

- Utilization of basic measurement techniques of fluid mechanics
- Understand the differences among measurement techniques.

SYLLAUS	(SEMESTER-III)	CREDITS: 3			INTERNAL ASSESSMENT (IA)			ESE
Subject Code:	CE03PES06	L	T	P	IA	MSE	TOTAL	
Subject:	Computer Aided Civil Engg.Drawing	0	0	3	30	0	30	20

Course objectives:

- To develop the capability to draw the basic detailed elements of structures like truss, beam, column etc. using Auto CAD
- To develop the capability to draw plan, section of residential building using Auto CAD
- To develop the capability to draw plan, section of public building using Auto CAD

Course Content:

List of Experiments:

1. Basic drawing for symbols used in building drawing
2. Drawing of different Foundation
3. Drawing of different masonry wall
4. Drawing of masonry bonds
5. Drawing of trusses
6. Drawing of retaining Wall
7. Drawing of Stair case, Doors and Windows
8. Plan, elevation and section of Residential Building
9. Plan, elevation and section of Public Building like school, college etc.
10. Detailing of beam, column and slab

Text Books / References:

1. N Krishna Raju, Structural Design and Drawing, Second Edition, Universities Press (India), Private Limited, Hyderabad, 2009
2. AutoCAD Essentials, Autodesk official Press, John Wiley & Sons, US, 2015

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

- To draw planning and detailing of residential building with the help of Auto CAD software
- To draw other Civil Engineering structures with the help of Auto CAD software

SYLLAUS	(SEMESTER-IV)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE04THS04	L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject:	Engineering Economics	3	0	0	15	15	30			

Course Learning Objectives:

To learn about the basics of economics and cost analysis related to engineering so as to take economically sound decisions

Course Content:

UNIT 1: Introduction to Economics

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Introduction to Economics- Flow in an economy, Law of supply and demand, Concept of Engi Economics – Engineering efficiency, Economic efficiency, Scope of engineering economics- Elem costs, Marginal cost, Marginal Revenue, Sunk cost, Opportunity cost, Break-even analysis- V Elementary economic Analysis – Material selection for product Design selection for a product, I planning.

UNIT 2: Value Engineering

Make or buy decision, Value engineering – Function, aims, Value engineering procedure. Interest fo and their applications –Time value of money, Single payment compound amount factor, Single pa present worth factor, Equal payment series sinking fund factor, Equal payment series payment Present factorequal payment series capital recovery factor-Uniform gradient series annual equivalent factor, Ef interest rate, Examples in all the methods.

UNIT 3: Cash Flow

Methods of comparison of alternatives – present worth method (Revenue dominated cash flow dia Future worth method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), A equivalent method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), rate of method, Examples in all the methods.

UNIT 4: Replacement and Maintenance Analysis

Replacement and Maintenance analysis – Types of maintenance, types of replacement problem, determ of economic life of an asset, Replacement of an asset with a new asset – capital recovery with retu concept of challenger and defender, Simple probabilistic model for items which fail completely.

UNIT 5: Depreciation

Depreciation- Introduction, Straight line method of depreciation, declining balance method of deprec Sum of the years digits method of depreciation, sinking fund method of depreciation/ Annuity met depreciation, service output method of depreciation-Evaluation of public alternatives- introduction, Exa Inflation adjusted decisions – procedure to adjust inflation, Examples on comparison of alternativ determination of economic life of asset.

TEXT BOOKS:

1. Panneer Selvam, R, —Engineering Economicsl, Prentice Hall of India Ltd, New Delhi, 2001.
2. Suma Damodaran, — Managerial economicsl, Oxford university press 2006.

REFERENCES:

1. Chan S.Park, —Contemporary Engineering Economicsl, Prentice Hall of India, 2002.
2. Donald.G. Newman, Jerome.P.Lavelle, —Engineering Economics and analysisl Engg. Press, Texas,
3. Degarmo, E.P., Sullivan, W.G and Canada, J.R, —Engineering Economyl, Macmillan, New York, 19
4. Grant.E.L., Ireson.W.G., and Leavenworth, R.S, —Principles of Engineering Economyl, Ronald New York,1976.
5. Smith, G.W., —Engineering Economyl, Lowa State Press, Iowa, 1973.
6. Truett & Truett, — Managerial economics- Analysis, problems & cases — Wiley India 8 Th edition
7. Luke M Froeb / Brian T Mccann, — Managerail Economics – A problem solving approachl Th learning 2007.

Outcome: At the end of the course students will be able

- To understand the basic economic principles of wants, scarcity, choice, opportunity cost; etc has app business organizations and engineering firms. Understand the time value of money and how to ske cash flow diagram.

SYLLAUS	(SEMESTER-IV)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE04TPC05	L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject:	**Concrete Technology**	3	0	0	15	15	30			

Course Learning Objectives:

- To learn about various ingredients materials of concrete, like cement aggregates, water, etc
- To learn about various admixtures that enhances the properties of concrete.
- To learn about various properties of concrete, its design mix
- To study about various types of special concrete

Course Content:

Unit 1: Constituent Material

Cement-Different types-Chemical composition and Properties -Tests on cement-IS Specifications- Aggregates-Classification-Mechanical properties and tests as per BIS grading requirements- Water- Quality of water for use in concrete.

Unit 2: Chemical and Mineral Admixtures

Accelerators-Retarders- Plasticisers- Super plasticizers- Water proofers – Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaolin -Their effects on concrete properties

Unit 3: Proportioning of Concrete Mix

Principles of Mix Proportioning-Properties of concrete related to Mix Design Physical properties of materials required for Mix Design – Design Mix and Nominal Mix-BIS Method of Mix Design – Mix Design Examples

Unit 4: Fresh and Hardened Properties of Concrete:

Workability-Tests for workability of concrete-Slump Test and Compacting factor Test-Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS – Properties of Hardened concrete-Determination of Compressive and Flexural strength-Stress-strain curve for concrete Determination of Young's Modulus.

Unit 5: Special Concretes:

Light weight concretes – High strength concrete – Fibre reinforced concrete – Ferrocement – Ready mix concrete – Slurry infiltrated fibrous concrete (IFCON) - Shotcrete – Polymer concrete – High performance concrete- Geopolymer Concrete.

Text Books:

1. Gupta.B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010.
2. Shetty,M.S, "Concrete Technology", S.Chand and Company Ltd, New Delhi, 2003
3. Santhakumar,A.R; "Concrete Technology" , Oxford University Press, New Delhi, 2007
4. Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995
5. Gambir, M.L; "Concrete Technology", 3rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2007
6. IS10262-1982 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi, 1998

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

- Understand properties and role of ingredients like cement, aggregate, admixtures etc. to produce better quality concrete
- Select the appropriate admixture for better performance of the concrete

- Design the concrete mix by IS Method
- Perform destructive, semi-destructive and non-destructive tests for concrete
- Differentiate between normal concrete and other special concretes
- Demonstrate advancements in concreting materials and techniques

SYLLAUS	(SEMESTER-IV)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE04THS05	L	T	P	CT-1	CT-II	TOTAL	70	100	02
Subject:	Professional Practice, Law & Ethics	2	0	0	15	15	30			

Course Learning Objectives

- To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
- To develop some ideas of the legal and practical aspects of their profession.

Course Content

UNIT 1: Professional Practice – Respective roles of various stakeholders: Government (constituting regulatory bodies and standardization organizations, prescribing norms to ensure safety of the citizens); Standardization Bodies (ex. BIS, IRC)(formulating standards of practice); professional bodies (ex. Institution of Engineers(India), Indian Roads Congress, IIA/ COA, ECI, Local Bodies/ Planning Authorities) (certifying professionals and offering platforms for interaction); Clients/ owners (role governed by contracts); Developers (role governed by regulations such as RERA); Consultants (role governed by bodies such as CEAI); Contractors (role governed by contracts and regulatory Acts and Standards); Manufacturers/ Vendors/ Service agencies (role governed by contracts and regulatory Acts and Standards). Professional Ethics – Definition of Ethics, Professional Ethics, Business Ethics, Corporate Ethics, Engineering Ethics, Personal Ethics; Code of Ethics as defined in the website of Institution of Engineers (India); Profession, Professionalism, Professional Responsibility, Professional Ethics; Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the-art; Vigil Mechanism, Whistleblowing, protected disclosures.

UNIT 2: General Principles of Contracts Management: Indian Contract Act, 1972 and amendments covering General principles of contracting; Contract Formation & Law; Privacy of contract; Various types of contract and their features; Valid & Voidable Contracts; Prime and sub-contracts; Joint Ventures & Consortium; Complex contract terminology; Tenders, Request For Proposals, Bids & Proposals; Bid Evaluation; Contract Conditions & Specifications; Critical /"Red Flag" conditions; Contract award & Notice To Proceed; Variations & Changes in Contracts; Differing site conditions; Cost escalation; Delays, Suspensions & Terminations; Time extensions & Force Majeure; Delay Analysis; Liquidated damages & Penalties; Insurance & Taxation; Performance and Excusable Non-performance; Contract documentation; Contract Notices; Wrong practices in contracting (Bid shopping, Bid fixing, Cartels); Reverse auction; Case Studies; Build-Own-Operate & variations; Public- Private Partnerships; International Commercial Term.

UNIT 3: Arbitration, Conciliation and ADR (Alternative Dispute Resolution) system: Arbitration – meaning, scope and types – distinction between laws of 1940 and 1996; UNCITRAL model law – Arbitration and expert determination; Extent of judicial intervention; International commercial arbitration; Arbitration agreements – essential and kinds, validity, reference and interim measures by court; Arbitration tribunal – appointment, challenge, jurisdiction of arbitral tribunal, powers, grounds of challenge, procedure and court

assistance; Award including Form and content, Grounds for setting aside an award, Enforcement, Appeal and Revision; Enforcement of foreign awards – New York and Geneva Convention Awards; Distinction between conciliation, negotiation, mediation and arbitration, confidentiality, resort to judicial proceedings, costs; Dispute Resolution Boards; Lok Adalats.

UNIT 4: Engagement of Labour and Labour & other construction-related Laws: Role of Labour in Civil Engineering; Methods of engaging labour- on rolls, labour sub-contract, piece rate work; Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Workmen's Compensation Act, 1923; Building & Other Construction Workers (regulation of employment and conditions of service) Act (1996) and Rules (1998); RERA Act 2017, NBC 2017

UNIT 5: Law relating to Intellectual property: Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to Copyright in India including Historical evolution of Copy Rights Act, 1957, Meaning of copyright – computer programs, Ownership of copyrights and assignment, Criteria of infringement, Piracy in Internet – Remedies and procedures in India; Law relating to Patents under Patents Act, 1970 including Concept and historical perspective of patents law in India, Patentable inventions with special reference to biotechnology products, Patent protection for computer programs, Process of obtaining patent – application, examination, opposition and sealing of patents, Patent cooperation treaty and grounds for opposition, Rights and obligations of patentee, Duration of patents – law and policy considerations, Infringement and related remedies.

1. B.S. Patil, Legal Aspects of Building and Engineering Contracts, 1974.
2. The National Building Code, BIS, 2017
3. RERA Act, 2017
4. Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset
5. Neelima Chandiramani (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai
6. Avtarsingh (2002), Law of Contract, Eastern Book Co.
7. Dutt (1994), Indian Contract Act, Eastern Law House
8. Anson W.R. (1979), Law of Contract, Oxford University Press
9. Kwatra G.K. (2005), The Arbitration & Conciliation of Law in India with case law on UNCITRAL Model Law on Arbitration, Indian Council of Arbitration
10. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
11. T. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House
12. Bare text (2005), Right to Information Act
13. O.P. Malhotra, Law of Industrial Disputes, N.M. Tripathi Publishers
14. K.M. Desai(1946), The Industrial Employment (Standing Orders) Act
15. Rustamji R.F., Introduction to the Law of Industrial Disputes, Asia Publishing House
16. Vee, Charles & Skitmore, Martin (2003) Professional Ethics in the Construction Industry, Engineering Construction and Architectural management, Vol.10, Iss2,pp 117-127, MCB UP Ltd
17. American Society of Civil Engineers (2011) ASCE Code of Ethics – Principles Study and Application
18. Ethics in Engineering- M.W.Martin& R.Schinzinger, McGraw-Hill
19. Engineering Ethics, National Institute for Engineering Ethics, USA
20. www.ieindia.org
21. Engineering ethics: concepts and cases – C. E. Harris, M.S. Pritchard, M.J.Rabins
22. CONSTRUCTION CONTRACTS, http://www.jnormanstark.com/contract.htm
23. Internet and Business Handbook, Chap 4, CONTRACTS LAW, http://www.laderapress.com/laderapress/contractslaw1.html
24. Contract&Agreements

http://www.tco.ac.ir/law/English/agreements/General/Contract%20Law/C.htm
25. Contracts, http://206.127.69.152/jgretch/crj/211/ch7.ppt
26. Business & Personal Law. Chapter 7. "How Contracts Arise",
http://yucaipahigh.com/schristensen/lawweb/lawch7.ppt
27. Types of Contracts, http://cmsu2.cmsu.edu/public/classes/rahm/meiners.con.ppt
28. IV. TYPES OF CONTRACTS AND IMPORTANT PROVISIONS,
http://www.worldbank.org/html/opr/consult/guidetxt/types.html
29. Contract Types/Pricing Arrangements Guideline- 1.4.G (11/04/02),
http://www.sandia.gov/policy/14g.pdf

Course Outcome

At the end of the course student will be able to

- To familiarise the students to what constitutes professional practice, introduction of various stakeholders and their respective roles; understanding the fundamental ethics governing the profession
- To give a good insight into contracts and contracts management in civil engineering, dispute resolution mechanisms; laws governing engagement of labour
- To give an understanding of Intellectual Property Rights, Patents.
- To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
- To develop good ideas of the legal and practical aspects of their profession

SYLLAUS	(SEMESTER-IV)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE04TPC06	L	T	P	CT-1	CT-II	TOTAL	70	100	04
Subject:	Structural Analysis-I	3	1	0	15	15	30			

Course Learning Objectives

- To study about the strain energy principles and their applications to beams and pin joint plane frames
- To learn about analysis of arches &cables.
- To learn how to draw influence line diagrams for beams and arches
- To study about the maximum SF, BM and absolute max BM
- To learn about the static and kinematic indeterminacy of structures and methods of analysis, analysis of fixed and continuous beams

Course Content:

UNIT-1: Principle of superposition, virtual work principle, Maxwell reciprocal theorem, deflection of beams using conjugate beam method. Deflection of beams and truss using energy method (Castigiliano theorem), Analysis of plane truss using tension coefficient method (determinate)

UNIT-2: Three-hinged Arches: Bending Moment, Shear force, axial force for three-hinged arches, Analysis of Suspension Bridge without stiffening girders.

UNIT-3: Influence Lines: Basic concept of moving load and influence line; influence lines for reactions, Shearing for.es and bending moments for determinate beams; absolute maximum shearing force and bending moment.

UNIT-4: Influence lines for three-hinged arches and stresses in simply supported plane determinate trusses

UNIT-5: Static and kinematic indeterminacy of structure, Method of structural analysis, Analysis of fixed beam, continuous beam using Theorem of three moments Effect of yielding of supports.

Reference Book:

1. Elementary structural Analysis by A.K. Jain
2. Advanced Structural Analysis by A. K. Jain

Outcome: At the end of the course students will be able

- To explain the concept of strain energy and analyse the determinate beams and trusses
- To able to analysis three hinged arches.
- To apply and analyse the concept of influence lines for deciding the critical forces and sections while designing
- Classify & discuss statically determinate & indeterminate structures, to find out the static and kinematic indeterminacy of the structure,
- To differentiate the force and displacement methods.
- To analysis the fixed and continuous beams by using theorem of three moments
- To understand the effect of temperature, yielding of supports in indeterminate structures

SYLLAUS	(SEMESTER-IV)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE04TPC07	L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject:	Fluid Mechanics-II	3	0	0	15	15	30			

Course Learning Objectives:

- To study the different flows in pipe like turbulent, and non-uniform flow in open channel.
- To study the effect of boundary layer against the flow.
- To understand the dimensional analysis in model and prototype.
- To study the hydraulic machines like turbine and pumps.

Course Content:

UNIT-1: Turbulent flow in pipe: Nature of turbulence, free and wall turbulence, turbulent flow in pipes, equation for velocity distribution over smooth and rough surfaces, Colebrook-White equation, Moody's diagram, Explicit equation for friction factors.

UNIT -2: Boundary layer Analysis: Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, turbulent boundary layer, and laminar sub layer, Application of momentum equation, local and average friction coefficient. Fluid flow past submerged bodies. Drag and lift, drag on sphere and cylinder Magnus effect.

UNIT-3: Non-uniform flow in open channel: Specific energy, critical flow, analysis of flow over hump and transition, equation of gradually varied flow, hydraulic jump and evaluation of its elements in rectangular channel.

UNIT-4: Compressibility effect in pipe flow: Transmission of pressure waves in rigid and elastic pipes, water hammer Dimensional analysis and Hydraulic similitude. Dimensional analysis, Buckingham's theorem, important dimensionless numbers and their significances, geometric, kinematics and dynamic similarity, model study.

UNIT-5: Hydraulic Machines: Turbines: Classification of turbines, draft tube, specific speed, unit quantities, and characteristics curves of turbines, and governing of turbine. Pump: Introduction, Centrifugal pumps, efficiencies, specific speed, cavitations, slip, percentage slip.

Name of Text Books:

1. Fluid Mechanics and Machines – Dr. A.K. Jain (Khanna Publications)
2. Fluid Mechanics and Machines – Dr. R.K. Bansal (Laxmi Publications)
3. Fluid Mechanics – Dr. P.N. Modi (Standard Book House)
4. Mechanics of Fluid – Irving H. Shames (McGraw Hill)
5. Introduction to Fluid Mechanics – James A. Fay (Prentice Hall India)

Name of Reference Books:

1. Fluid Machines – Dr.JagdishLal (Metropolitan Book Company Private Ltd.)
2. Fluid Machines – John P. Douglas (Pearson Publication)

Outcome: At the end of the course students will be able to

- To understand the difference between broad principles of flow of fluid, for instance laminar and turbulent flow.
- To understand boundary layer effect and importance of dimensional analysis in design of stream lined object.
- To understand the functioning of turbines and pipes.

SYLLAUS	(SEMESTER-IV)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE04THS06	L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject:	Effective Technical Communication	3	0	0	15	15	30			

Course Learning Objectives:

Effective Technical communication is critical in today's world. Most problems in an organization arise as a result of poor communication. Effective communication ensures a smooth flow of ideas, facts, decisions, and advice. This way, employees eliminate hindrances in achieving the organization's target.

Course Content:

Unit-1 Fundamentals of Communication Technical Communication: features: Distinction between General and Technical communication; Language as a tool of communication; Levels of communication: Interpersonal, Organizational, Mass communications; the flow of Communication: Downward, Upward, Lateral of Horizontal (Peer group): Importance of technical communication; Barriers to Communication.

Unit-2 Constituents of Technical Written Communication Words and Phrases: Word formation. Synonyms and Antonyms; Homophones; Select vocabulary of about 500-1000 New words; Correct Usage: all Parts of Speech; Modals; Concord; Articles; Infinitives; Requisites of Sentence Construction: Paragraph Development: Techniques and Methods- Inductive, Deductive, Spatial, Linear, Chronological etc; The Art of Condensation-various steps.

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Unit-3 Business Communication Principles, Sales & Credit letters; Claim and Adjustment Letters; Job application and Resumes. Reports: Types; Significance; Structure, Style & Writing of Reports. Technical Proposal; Parts; Types; Writing of Proposal; Significance. Negotiation & Business Presentation skills.

Unit-4 Presentation Strategies and Listening Skills. Defining Purpose; Audience & Local; Organizing Contents; Preparing Outline; Audio-visual Aids; Nuances of Delivery; Body Language; Dimensions of Speech: Syllable; Accent; Pitch; Rhythm; Intonation; Paralinguistic features of voice; Listening Skills: Active Listening, Passive Listening. methods for improving Listening Skills.

Unit-5 Value-Based Text Readings Following essays form the suggested text book with emphasis on Mechanics of writing. (i) Humanistic and Scientific Approaches to Human Activity by Moody E. Prior (ii) The Language of Literature and Science by A. Huxley (iii) Man and Nature by J.Bronowski (iv) The Social Function of Literature by Ian Watt (v) Science and Survival by Barry Commoner (vi) The Mother of the Sciences by A.J.Bahm (vii) The Effect of Scientific Temper on Man by Bertrand Russell.

Text Book :

1. Improve Your Writing ed. V.N.Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi..
2. Technical Communication: A Practical Approach: Madhu Rani and Seema Verma- Acme Learning, New Delhi-2011
3. Technical Communication- Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press,2007, New Delhi.

Reference Books:

1. Communication Skills for Engineers and Scientists, Sangeeta Sharma et.al. PHI Learning Pvt.Ltd,2011, New Delhi.
2. Business Correspondence and Report Writing by Prof. R.C.Sharma & Krishna Mohan, Tata McGraw Hill & Co.Ltd.,2001, New Delhi.
3. Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. &Distributors, 2009,Delhi.
4. Developing Communication Skills by Krishna Mohan, Mecra Bannerji- Macmillan India Ltd. 1990, Delhi.
5. Manual of Practical Communication by L.U.B.Pandey: A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2013, Delhi.
6. English Grammar and Usage by R.P.Sinha,

Course Outcomes:

- At the end of the semester, employability skills of the students will develop.
- Students will improve their Vocabulary and their Accent.

SYLLAUS	(SEMESTER-IV)	CREDITS: 1			INTERNAL ASSESSMENT (IA)			ESE
Subject Code:	CE04PHS01	L	T	P	IA	MSE	TOTAL	
Subject:	Effective Technical Communication Lab	0	0	2	30	-	30	20

Course Learning Objectives:

Interactive and Communicative Practical with emphasis on Oral Presentation/Spoken Communication based on International Phonetic Alphabets (I.P.A.)

Course Content:

LIST OF PRACTICALS:

1. Group Discussion: Practical based on Accurate and Current Grammatical Patterns.
2. Conversational Skills for Interviews under suitable Professional Communication Lab conditions with emphasis on Kinesics.
3. Communication Skills for Seminars/Conferences/Workshops with emphasis on Paralinguistics/ Kinesics.
4. Presentation Skills for Technical Paper/Project Reports/ Professional Reports based on proper Stress and Intonation Mechanics.
5. Official/Public Speaking based on suitable Rhythmic Patterns.
6. Theme- Presentation/ Key-Note Presentation based on correct argumentation methodologies.
7. Individual Speech Delivery/Conferences with skills to defend Interjections/Quizzes.
8. Argumentative Skills/Role Play Presentation with Stress and Intonation.
9. Comprehension Skills based on Reading and Listening Practicals on a model Audio-Visual Usage.

Reference Books:

1. Bansal R.K. & Harrison: Phonetics in English, Orient Longman, New Delhi.
2. Sethi & Dhamija: A Course in Phonetics and Spoken English, Prentice Hall, New Delhi.
3. L.U.B.Pandey & R.P.Singh, A Manual of Practical Communication, A.I.T.B.S. Pub. India Ltd. Krishan Nagar, Delhi.
4. Joans Daniel, English Pronouncing Dictionary, Cambridge Univ. Press.

Course Outcomes: On completion of the course, the students would be able to:

- Improve interpersonal communication
- Overcome stage fright and enhance confidence
- Participate in GDs
- Master presentation Skills and Interview Skills
- Learn and practice Listening, Reading, Writing and Speaking Skills

SYLLAUS	(SEMESTER-IV)	CREDITS: 3			INTERNAL ASSESSMENT (IA)			ESE
Subject Code:	CE04PPC03	L	T	P	IA	MSE	TOTAL	
Subject:	Material testing lab	0	0	3	30	0	30	20

Course Learning Objectives:

- To learn to perform various experiments related to properties of Cement.
- To learn to perform various experiments related to properties of Aggregates.
- To learn to perform various experiments related to properties of Bricks.
- To learn to perform various Destructive & non –destructive tests on concrete.

Course Content:

List of experiments

Testing of cement

1. Normal Consistency, Fineness of Cement, Setting times of Cement
2. Specific Gravity of Cement
3. Soundness of Cement
4. Compressive strength of cement

Testing of aggregate

5. Fineness modulus of Fine and Coarse aggregate
6. Bulk density of aggregate
7. Specific Gravity and Water Absorption of Aggregate
8. Bulking of Sand

Testing of bricks

9. Compressive strength, Water Absorption &Efflorescence of Bricks

Testing of concrete

10. Workability of Concrete
11. Compressive strength
12. Modulus of Elasticity
13. Tensile Strength of Concrete
14. NDT Test of Concrete

Outcomes: At the end of the course students will be able

- The students will have acquired the knowledge in the area of testing of construction materials.
- By knowing the properties of materials, it will be possible to design concrete mix that will be of desired properties

V SEMESTER B.TECH. (CIVIL ENGG.)

Sl No	Subject Code	Subjects	Periods /Week			Evaluation Scheme						Grand Total	Credits
						Internal Assessment					E.S.E		
		Theory	L[1]	T[2]	P[3]	C.T.[5]	M.S.E[6]	T.A.[5]	L.A.[7]	Total			
1	CE5TPC07	Design of Concrete Structures	3	1	0	10	20	10	-	40	60	100	4
2	CE5TPC08	Structural Analysis - II	3	1	0	10	20	10	-	40	60	100	4
3	CE5TPC09	Highway Engineering	3	0	0	10	20	10	-	40	60	100	3
4	CE5TPC10	Estimation and Costing	3	0	0	10	20	10	-	40	60	100	3
5	CE5TPC11	Geotechnical Engineering - I	3	0	0	10	20	10	-	40	60	100	3
6	CE5TPC12	Environmental Engineering - I	3	0	0	10	20	10	-	40	60	100	3
		Practical											
1	CE5LPC04	Highway Engineering Lab	-	-	3	-	-	-	30	30	20	50	2
2	CE5LPC05	Environmental Engineering Lab	-	-	3	-	-	-	30	30	20	50	2
											Total Credits		24

VI SEMESTER B.TECH. (CIVIL ENGG.)

Sl No	Subject Code	Subjects	Periods /Week			Evaluation Scheme						Grand Total	Credits
						Internal Assessment					E.S.E		
		Theory	L[1]	T[2]	P[3]	C.T.[5]	M.S.E[6]	T.A.[5]	L.A.[7]	Total			
1	CE6TPC13	Water Resources Engineering -I	3	0	0	10	20	10	-	40	60	100	3
2	CE6TPC14	Environmental Engineering - II	3	0	0	10	20	10	-	40	60	100	3
3	CE6TPC15	Design of Steel Structures	3	1	0	10	20	10	-	40	60	100	4
4	CE6TPC16	Geotechnical Engineering- II	3	0	0	10	20	10	-	40	60	100	3
5	CE6TPE1X	Professional Elective -1X	3	1	0	10	20	10	-	40	60	100	4
6	CE6TOE1X	Open Elective -1X	3	0	0	10	20	10	-	40	60	100	3
		Practical											
1	CE6LPC05	Geotechnical Engineering - Lab	0	0	3	-	-	-	30	30	20	50	2
2	CE6LPC06	Computer & Applications in Civil Engg. Lab	0	0	3	-	-	-	30	30	20	50	2
											Total Credits		24
		Note: Industrial Training for one month is mandatory after end semester examination											

X_ indicates the serial alphabet of a subject in the subject group
[1]-Lecture Hours, [2]- Tutorial Hours, [3]- Practical Hours, [4]- Mid Sem. Exam, [5]-Class Tests/Assignments, [6]-Lab Work Assessment

06/06/17

(R.V. Ahuja)

6/6/17
(Dr. U.K. Dewangan)
NIT Raipur.

06/06/17

06/06/17

List of Professional (Core) Electives

Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE6TPE1X	Professional Elective-1 (PE Group-1)	4	VI
A	CE6TPE1A	Advanced Concrete Technology		
B	CE6TPE1B	Advanced Surveying		
C	CE6TPE1C	Advanced Concrete Design		
D	CE6TPE1D	Highway Safety		
E	CE6TPE1E	Advanced Fluid Mechanics		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE7TPE2X	Professional Elective-2 (PE Group-2)	4	VII
A	CE7TPE2A	Design of Prestressed Concrete		
B	CE7TPE2B	Structural Dynamics		
C	CE7TPE2C	Theory of Elasticity & Plasticity		
D	CE7TPE2D	Fracture of Concrete Structures		
E	CE7TPE2E	Advance Structural Analysis		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE7TPE3X	Professional Elective-3 (PE Group-3)	3	VII
A	CE7TPE3A	Environmental Geotechnical Engineering		
B	CE7TPE3B	Air Pollution Control Engineering		
C	CE7TPE3C	Industrial Waste Water Management		
D	CE7TPE3D	Water Resources Planning & Management		
E	CE7TPE3E	Environmental Impact Assessment		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE7TPE4X	Professional Elective-4 (PE Group-4)	3	VII
A	CE7TPE4A	Ground Water Hydrology		
B	CE7TPE4B	Ground Improvement Techniques		
C	CE7TPE4C	Geo-Informatics & GIS Applications		
D	CE7TPE4D	Rock Mechanics		
E	CE7TPE4E	Design of Hydraulic Structures		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE7TPE5X	Professional Elective-5 (PE Group-5)	3	VII
A	CE7TPE5A	Industrial Structures		
B	CE7TPE5B	Systems Analysis in Civil Engineering		
C	CE7TPE5C	Railway Engineering		
D	CE7TPE5D	Pavement Construction and Maintenance		
E	CE7TPE5E	Planning & Design of Building Services		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE8TPE6X	Professional Elective-6 (PE Group-6)	4	VIII
A	CE8TPE6A	Machine Foundation		
B	CE8TPE6B	Earthquake Geotechnical Engineering		
C	CE8TPE6C	Bridge Engineering		
D	CE8TPE6D	Solid and Hazardous Waste Management		
E	CE8TPE6E	Construction Equipment & Techniques		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE8TPE7X	Professional Elective-7 (PE Group-7)	3	VIII
A	CE8TPE7A	Air and Water Transportation		
B	CE8TPE7B	Theory of Plates & Shells		
C	CE8TPE7C	Repair and Rehabilitation of Structures		
D	CE8TPE7D	Finite Element Analysis		
E	CE8TPE7E	Hydropower Engineering		

List of Open Electives

Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE6TOE1X	Open Elective-1 (OE Group-1)	3	VI
A	CE6TOE1A	Construction Planning and Management		
B	CE6TOE1B	Rural Technology and Community Development		
C	CE6TOE1C	Engineering System Design Optimization		
D	CE6TOE1D	Engineering System Modelling and Simulation		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE7TOE2X	Open Elective-2 (OE Group-2)	3	VII
A	CE7TOE2A	Value Engineering		
B	CE7TOE2B	Supply Chain Management-Planning		
C	CE7TOE2C	Travel Demand Analysis		
D	CE7TOE2D	Quality Control Assurance and Safety in Construction		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE8TOE3X	Open Elective-3 (OE Group-3)	3	VIII
A	CE8TOE3A	Management Information System		
B	CE8TOE3B	Enterprise Resource Planning		
C	CE8TOE3C	Engineering Risk-Benefit Analysis		
D	CE8TOE3D	Fluid Dynamics		

SYLLABUS	[SEMESTER-V]								
Subject Code:	CESTPC07	CREDITS: 4			SESSIONAL - TA				ESE
Subject:	Design of Concrete Structures	L	T	P	CT	MSE	TA	TOTAL	
		3	1	-	10	20	10	40	60

UNIT – 1: Introduction to design of concrete structures-limit state analysis and design of beams flexure, bond

UNIT- 2: Shear and torsion

UNIT-3: One way slabs, stair cases, Two-way slabs

UNIT- 4: Axially and eccentrically loaded columns. (uniaxial only)

UNIT-5: Footings – different types of isolated footings, synthesis of limit state and working St methods.

REFERENCE BOOK:
Reinforced Concrete Design by Pillai & Menon
Limit State Design of Reinforced Concrete by P.C. Verghese

SYLLABUS	(SEMESTER-V)								
Subject Code:	CESTPC08	CREDITS: 4			SESSIONAL - TA				ESE
Subject:	Structural Analysis - II	L	T	P	CT	MSE	TA	TOTAL	
		3	1	-	10	20	10	40	60

UNIT-1: Analysis of indeterminate beams by Consistent Deformation methods, Analysis of indeterminate rigid plane frames and truss using energy method.

UNIT-2: Slop Deflection Method: Continuous beams and portals by moment distribution due to load and yielding of supports.

UNIT-3: Moment-distribution method. Continuous beams and portals by moment distribution due to load and yielding of supports.

UNIT-4: Introduction to Flexibility matrix and Stiffness Matrix methods: Applications of the methods to simple indeterminate beams.

UNIT-5: Analysis of symmetrical two hinge arches (parabolic and circular). Influence lines for propped cantilevers, continuous beams using Muller-Breslau's principle.

REFERENCE BOOK:
Indeterminate Structural Analysis by C. K. Wang
Fundamental of Structural Analysis by Leet.

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SYLLABUS	(SEMESTER-V)								
Subject Code:	CESTPC09	CREDITS: 3			SESSIONAL - TA				ESE
Subject:	Highway Engineering	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	10	40	60

UNIT 1: Introduction: Importance of highway transportation, Modes of transportation, cherecteristics of highway transport. Historical development & planning: Historical development of roads, Road development and planning in India, Necessity of planning, Roads classification, patterns, Planning surveys. Highway alignment and surveys: Engineering Surveys for highway location Maps and Drawing. Highway drainage: Importance, Surface and subsurface drainage.

UNIT 2: Geometric Design: Cross Section elements, Sight Distance, Design of horizontal and vertical Alignment.

UNIT 3: Traffic Engineering: Traffic characteristics, studies such as volume, density, Speed, 'O' and 'D' and their uses, Traffic control devices and road accidents.

UNIT 4: Highway Materials: Behaviour of highway materials, properties of Subgrade materials and pavement component materials. Tests on subgrade soil, aggregate and bitumen.

UNIT 5: Pavement Design: Types of pavements, Factors affecting design of flexible and rigid pavements, Design of flexible pavements: Group index, I.R.C. recommended method, California highway department method, U. S. Corp method
Design of Rigid pavement: Westergard's stress analysis of wheel loads for design of pavement, effect of temperature and warping stress in design

TEXT BOOK:
Principle and Practices of Highway Engineering – Kadiyali & Lal (Khanna Publishers, Delhi)
Highway Engineering – S. K. Khanna & C.E.G. Justo (Khanna Publishers, Delhi)
Highway Engineering – Rangawala S.C. (Charotar Publishers)
A textbook of Transportation Engineering – S.P. Chandola (S. Chand)
Transportation Engineering – A.K. Upadhyay (S.K. Kataria & Sons)

REFERENCE BOOK:
Specifications for Road and Bridge Works – MOST (IRC Publishers) Manual for Survey, Investigation and Preparation of Road Projects – IRC Publication 2001.

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SYLLABUS	(SEMESTER-V)								
Subject Code:	CE5TPC10	CREDITS: 3			SESSIONAL - TA				ESE
Subject:	Estimation and Costing	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	10	40	60

UNIT-1: Method of estimating, measurements, taking out quantities.

UNIT-2: Typical estimates for buildings and Civil Engineering Works, Specifications for all types building items.

UNIT-3: Analysis of rates, data for various building items.

UNIT-4: Earthwork calculations.

UNIT-5: Introduction to Departmental procedures, tender, contracts, arbitrations, valuation of buildings.

REFERENCE BOOKS:
B.N Dutta, Estimating and Costing in Civil Engineering Theory and Practice
M. Chakraborti, Estimating, Costing and Specifications in Civil Engineering.

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SYLLABUS	(SEMESTER-V)								
Subject Code:	CESTPC11	CREDITS : 3			SESSIONAL - TA				ESE
Subject:	Geotechnical Engineering - I	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	10	40	60

Unit 1: Introduction, Basic Definitions and Relationships, Determination of Index Properties, Classification of Soils.

Unit 2: Soil Water: Types of soil water, Capillarity in soils, Permeability of soils, Darcy's law, Determination of permeability of soils, Permeability of stratified soils, Seepage velocity, Absolute coefficient of permeability, Factors affecting permeability- Effective stress principle- Effective stress under different field conditions- Seepage pressure-Quick sand condition.

Unit 3:Stress distribution in Soils: Importance of estimation of stresses in soils – Boussinesq's and Westergaard's theories for point loads, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horizontal planes – Newmark's influence chart.

Unit 4: Compaction of Soils: Definition and importance of compaction – Standard Proctor compaction test, Modified compaction test- Factors affecting compaction- Influence of compaction on soil properties – Field compaction and its control.
Consolidation: Types of compressibility – Immediate settlement – Primary consolidation and secondary consolidation – Stress history of clay, normally consolidated soil, over consolidated soil and under consolidated soil- pre consolidation pressure and its determination- Estimation of settlements - Terzaghi's 1-D consolidation theory – Coefficient of consolidation and its determination.

Unit 5:Shear Strength: Definition and use of shear strength - Source of shear strength- Normal and Shear stresses on a plane – Mohr's stress circle- Mohr-Coulomb failure theory- Measurement of shear strength, Drainage conditions -Direct shear test, Triaxial shear test, Unconfined compression test and Vane shear test – Factors affecting shear strength of granular soils and cohesive soils. Stability of Soil Slopes: Types of slopes – Types of slope failures – Slip circle method, Determination of centre of most critical slip circle – Taylor's stability charts and their use. Stabilisation of soil slopes.

REFERENCE BOOKS:

1. "Basic and Applied Soil Mechanics" by Gopal Ranjan and A.S.R. Rao, Wiley Eastern Ltd., New Delhi, 2009.
2. "Soil Mechanics and Foundation Engg" by V.N.S. Murthy, CBS Pub. New Delhi. 2007.
3. Geotechnical Engineering by B. M. Das, Bharat Singh, Samsher Alam
4. Geotechnical Engineering by S. K. Gulathi & Dutta
5. Soil Mechanics by Lambe & Whiteman
6. Soil Mechanics by B.C.Punamia.

SYLLABUS	(SEMESTER-V)								
Subject Code:	CE5TPC12	CREDITS: 3			SESSIONAL - TA				ESE
Subject:	Environmental Engineering - I	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	10	40	60

UNIT 1: Introduction: Necessity and importance of water supply schemes. Water demand: Classification of water demands, Estimation of quantity of water required by a town, per capita demand, factors affecting per capita demand, design period and population forecasting, variation in water demand. Sources of water supply. Surface sources and underground sources, Intake works, site selection, type of intake works.

UNIT 2: Quality of water: Common impurities, physical, chemical and biological characteristics of water, water quality standards for municipal and domestic supplies. Water Processing: Object of water processing, flow diagrams of typical ground water system and surface water systems. Sedimentation Theory of sedimentation, sedimentation tanks and its types, design parameters related with sedimentation tanks, sedimentation with coagulations, coagulants and coagulant aids, Jar test for determining coagulant dosage.

UNIT 3: Filtration: Theory of filtration, slow sand and rapid sand filters, Construction and operation. Disinfection, Methods of disinfection, Chlorination, Types of chlorination, Break Point chlorination.

UNIT 4: Softening: Methods of Softening, Iron Removal, Fluoridisation. Distribution System: Methods of distribution, layout of distribution system, methods of analysis, pressure in the distribution system, distribution reservoirs, functions and its types, storage capacity of distribution reservoir.

UNIT 5: Air Pollution: Introduction, causes, sources, characteristics, effects of air pollution on plants, humans, animals and materials and atmosphere, air pollution control methods and equipment. Noise Pollution: Definition, sources, effects of noise pollution on humans, animals and non-living things, methods of noise control.

TEXT BOOKS:
Water Supply Engineering – S.K. Garg (Khanna Publication).
Water Supply Engineering – B.C. Punmia (Laxmi Publication, New Delhi)

REFERENCE BOOKS:
Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
Water Supply and Sanitary Engineering – G.S. Birdi (Dhanpat Rai Publications).
Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)
Environmental Science and Engineering – Henry and Heinke (Pearson Education)

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SYLLABUS	(SEMESTER-V)								
Subject Code:	CESLPC04	CREDITS: 2			SESSIONAL - TA				ESE
Subject:	Highway Engineering Lab	L	T	P	CT	MSE	TA	TOTAL	
		-	-	3	-	-	30	30	20

Minimum 10 experiments to be performed

1. To determine the crushing value of the given aggregate sample.
2. To determine 10% finer value of the given aggregate sample.
3. To determine the abrasion value of the given aggregate sample by los angeles apparatus.
4. To determine the impact value of the given aggregate sample.
5. To determine the elongation index of the given aggregate sample.
6. To determine the flakiness index of the given aggregate sample.
7. To determine the water absorption of the given coarse aggregate.
8. To determine the specific gravity of the given coarse aggregate.
9. To determine the penetration value of the given bitumen material.
10. To determine the softening point of the given bitumen material.
11. To determine the ductility of the given bitumen material.
12. To determine the viscosity of the given bitumen material.

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SYLLABUS	(SEMESTER-VI)								
Subject Code:	CE6LPC05	CREDITS: 2			SESSIONAL - TA				ESE
Subject:	Environmental Engineering Lab	L	T	P	CT	MSE	TA	TOTAL	
		-	-	3	-	-	30	30	20

Determination of the following Parameters in the given Water Sample:
1. Turbidity by Nephelometer.
2. TDS and fixed solids by Gravimetric method.
3. pH using pH-meter.
4. Carbonate, Bi-Carbonate & Hydroxide Alkalinity.
5. Dissolved Oxygen [DO] using DO meter.
6. Concentration of Chlorides.
7. Optimum coagulant dose for coagulation by Jar test apparatus.
8. Chlorine Demand of Water.
9. Total Hardness and Calcium Hardness.
10. Study of Weather Monitoring Station.
11. Study of Sound Level Meter.

SYLLABUS	(SEMESTER-VI)								
Subject Code:	CE6TPC13	CREDITS: 3			SESSIONAL - TA				ESE
Subject:	Water Resources Engineering -I	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	10	40	60

UNIT 1: Introduction: Need for Irrigation, advantages and disadvantages of irrigation, types of irrigation systems – Flow irrigation, Lift irrigation. Methods of irrigation: introduction, requirement of irrigation methods, surface and sub-surface irrigation. Water Requirement of crops: introduction, water requirement of crop, crop season and crops of India, crop period and base period, delta, duty of water, relationship between delta, duty and base period, factors affecting duty.

UNIT 2: Canal Irrigation: Classification of canal, parts of canal irrigation system, canal alignment, typical canal cross section, command areas, losses in irrigation systems. Design of stable channels in alluvium. Introduction, Kennedy's silt theory, Lacey's Theory, Lacey's regime equations, Lacey's shock theory. Design of channels by Kennedy's and Lacey's theories, maintenance of irrigation channels.

UNIT 3: Water Logging and its Control. Causes and ill effects of water logging, prevention and control, reclamation of water logged lands, surface drainage. Design of Lined Channels. Introduction, benefits of lining, types of lining, economics of lining, procedure and design of lined canals.

UNIT 4: River behaviour, control and training. Objects, river characteristics, classification of river training works, methods of river training embankments, bank protection, cut-offs, meandering causes and parameters. Flood Control; introduction, channel improvement, flood ways evacuation and flood plain zoning. National Policy of floods.

UNIT 5: Reservoir Planning: Introduction, type of reservoirs, storage zones of a reservoir, mass curve and demand curve, determination of reservoir capacity, safe field. Hydrograph, unit hydrograph, Flood Routing: flood Routing principle, inflow storage discharge method, reservoir losses, reservoir, sedimentation, life of reservoir.

TEXT BOOKS:
Irrigation Engineering and Hydraulic Structures – S.K. Garg (Khanna Publications)
Irrigation Engineering – B.C. Punmia (Laxmi Publications)

REFERENCE BOOKS:
Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House)
Theory and Design of Irrigation Structures (Volume – I & II) – Varshney (Nem Chand & Bros.)
Irrigation and Water resources Engineering – Asawa G.L. (New Age International Publications)
Fundamentals of Irrigation Engineering – Bharat Singh (Nem Chand & Bros)
Water Resources Engineering Larry -W. Mays (Wiley, John & Sons)

SYLLABUS	(SEMESTER-VI)								
Subject Code:	CE6TPC14	CREDITS: 3			SESSIONAL - TA				ESE
Subject:	Environmental Engineering - II	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	10	40	60

UNIT - 1: Objective, design period, Physical, Chemical and Biological characteristics. Waste water sampling, self-purification of natural streams, effluents Standards, Oxygen Sag Curve, sources of sewage. Design of sanitary sewers, minimum size of sewer, velocities in sewers and gradient of sewers. Sewer appurtenances viz. manholes, street inlets, flushing devices, Vent pipes etc.

UNIT – 2: Waste Water primary Treatment: characteristics of wastewater. Effluent discharge standards, Primary, secondary and tertiary treatment of wastewater. Types of screens, design of screen chamber, sources of grit, design of grit chamber, disposal of grit, oil and grease removing skimming tanks, design of PST with inlet and outlet details, primary sludge and its disposal

UNIT - 3: Aerobic Treatment UNITs: Biological principle of ASP, SVI, sludge bulking and control; biological principle of Trickling filter, re-circulation, operational troubles; Rotating biological contactor. Low cost treatment methods: Principle of Oxidation pond, symbiosis, principle of Aerated Lagoons, aeration method, Principle of Oxidation Ditches, sewage farming, ground water recharge.

UNIT- 4: Anaerobic Treatment UNITs: Septic tanks, biological Principle, method of treatment and disposal of tank effluent. Anaerobic digester, principle of anaerobic digestion, Stages of digestion, bio-gas production. Sludge disposal methods, advantages and disadvantages

UNIT – 5: Municipal Solid Wastes: Characteristics, generation, collection & transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment & disposal), environmental & health implications, disposal of solid waste by land filling, composting and incineration methods. Hazardous waste management, environmental and health implications due to Exposure, incineration, landfill disposal, site remediation, disposal of refuse by Composting.

TEXT BOOKS:
Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
Waste Water Engineering – S.K. Garg (Khanna Publication).
Manual on sewerage & sewage Treatment published by Ministry of Urban Dev. GOI, Ministry of Urban development

REFERENCE BOOKS:
Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).
Hazardous Waste management: M.D. LaGrega, P.L. Buckingham, J.C.Evans
Manual on Municipal Solid Waste Management: CPHEEO (Ministry of Urban Dev.)
Environmental Engineering-ILP.Venugopala Rao Tata McGraw Hill Water and Wastewater Technology ,Hammer (PHI)

SYLLABUS	(SEMESTER-VI)								
Subject Code:	CE6TPC15	CREDITS: 4			SESSIONAL - TA				ESE
Subject:	Design of steel Structures	L	T	P	CT	MSE	TA	TOTAL	
		3	1	-	10	20	10	40	60

UNIT 1: Introduction: General, types of Steel, mechanical behaviour of steel, measures of Yielding, measures of Ductility, types of Structures, Structural Steel Sections.
Methods of Structural design: Introduction- Design Philosophies-Working Stress method-Ultimate Strength method-Load and Resistant factor- Limit State Method-Partial safety factor-Load-Load combinations-Classification of Cross sections- General aspects in the design.

UNIT 2: Design of Steel fasteners: Types of fasteners – Riveted connections- Bolted connections- Assumptions- Failure of bolted joints – Strength of bolted joints – Design examples – Design of Welded connections – Butt weld- fillet weld – Design examples.

UNIT 3: Design of Tension Members: General – Modes of Failure of Tension member- Analysis of Tension members- Example - Design steps – Design examples – Lug angles – Design.
Design of Compression Members: General – Strength of Compression members- Design Compressive strength- Example on analysis of Compression members – Design of Angle struts – Design Examples- Built up Columns- Design of Lacing – Design of Battens- Design Examples- Design of Roof members.

UNIT 4: Design of Beams: General- Lateral Stability of Beams- Bending Strength of Beams – Plastic Section Modulus - Design Examples.
Design of Beam Columns: Behaviour of members under combined loading – Modes of Failures – Design Examples.
Design of Column Splices and Column Base: Design of Column Splice-Design Examples- Design of Column Base- Slab Base- Gusseted Base- Design Examples.

UNIT 5: Design of Eccentric Connections: Design of Brackets- Type-1 and Type 2 – Moment Resistant connections - Design Examples.
Design of Plate Girder: General- Components of Plate Girder- Optimum depth – Bending Strength – Shear Strength – Shear Buckling- Simple Post critical method- Tension Field method- Stiffeners- Bearing- Transverse stiffeners - Design Examples.

Reading:
1. Limit state Design of Steel Structures – Duggal.
2. Limit state Design of Steel structures – Bhavikatti S S.
3. IS-800-2007.
4. Limit state Design of Steel Structures - Arya & Azmani.

SYLLABUS	(SEMESTER-VI)								
Subject Code:	CE6TPC16	CREDITS: 3			SESSIONAL - TA				ESE
Subject:	Geotechnical Engineering- II	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	10	40	60

UNIT 1:Lateral Earth Pressures: Lateral earth pressure theory, different types of earth pressures, Rankine's active and passive earth pressures, pressure distribution diagram for lateral earth pressures against retaining walls for different conditions in cohesion less and cohesive soils, Coulomb's active and passive earth pressure theory, Culmann's graphical construction, Problems.

UNIT 2: Bearing capacity of foundation: Bearing capacity – Basic Definitions, Factors affecting bearing capacity, estimation of Bearing capacity by different methods. Analytical measures – Terzaghi's and Meyerhof methods and calculations. Field measures – SPT, CPT and Plate load tests. Settlement of foundation: Settlement analysis – Types of foundation settlement, Components of settlements - their estimation, allowable settlement values, effects, causes and remedial measures of total and differential settlements

UNIT 3: Shallow foundations: Types of shallow foundations and choice, basic requirements, significance of these foundations
Pile foundations: Classification and uses, load carrying capacity calculations by different methods – static methods, dynamic methods, in-situ penetration tests, piles load test; Negative skin friction; under reamed pile foundations; Pile groups – Necessity, Efficiency, Group capacity and settlements.

UNIT 4: Well foundations: Types of caissons and their construction; Different shapes of wells, componeet parts and forces; Estimation of bearing capacity, sinking of wells and remedial measures for tilts and shifts.

UNIT 5: Soil Exploration: Introduction and different methods – Direct methods, Semi-direct and Indirect methods; Sampling in soils and rocks; Subsurface exploration program - Preperation of bore logs and preparation of exploration report

Reading:

1. Murthy V.N.S (2007): Soil Mechanics and Foundation Engineering – CBS publications, Delhi.
2. Das, BM (2009): Geotechnical engineering – Cengage learning, New Delhi.
3. Gopal Ranjan, Rao ASR (2000): Basic and applied soil mechanics – New age publication, Delhi.
4. Iqbal H Khan (2007): Geotechnical Engineering – Prentice Hall, Delhi.
5. Basic & Applied Soil Mechanics. by- Gopal Ranjan & A. S. R. Rao
6. Foundation Analysis & Design by - J. E. Bowles

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SYLLABUS	(SEMESTER-VI)								
Subject Code:	CEGTPE1A	CREDITS: 4			SESSIONAL - TA				ESE
Subject:	Advanced Concrete Technology	L	T	P	CT	MSE	TA	TOTAL	
		3	1	-	10	20	10	40	60

UNIT – 1: Importance of Bogue's compounds, Structure of a Hydrated Cement Paste, Volume of hydrated product, porosity of paste and concrete, transition Zone, Elastic Modulus, factors affecting strength and elasticity of concrete, Rheology of concrete in terms of Bingham's parameter. CHEMICAL ADMIXTURES- Mechanism of chemical admixture, Plasticizers and super plasticizers and their effect on concrete property in fresh and hardened state, Marsh cone test for optimum dosage of super plasticizer, retarder, accelerator, Air-entraining admixtures, new generation super-plasticiser.
MINERAL ADMIXTURE-Fly ash, Silica fume, GGBS, and their effect on concrete property in fresh state and hardened state.

UNIT – 2: MIX DESIGN - Factors affecting mix design, design of concrete mix by BIS method using IS10262 and current American (ACI)/ British (BS) methods. Provisions in revised IS10252-2004.

UNIT – 3: DURABILITY OF CONCRETE - Introduction, Permeability of concrete, chemical attack, acid attack, efflorescence, Corrosion in concrete. Thermal conductivity, thermal diffusivity, specific heat. Alkali Aggregate Reaction, IS456-2000 requirement for durability.

UNIT – 4: RMC concrete - manufacture, transporting, placing, precautions, Methods of concreting-Pumping, under water concreting, shotcrete, High volume fly ash concrete concept, properties, typical mix, Self compacting concrete concept, materials, tests, properties, application and typical mix.

UNIT – 5: Fiber reinforced concrete - Fibers types and properties, Behaviour of FRC in compression, tension including pre-cracking stage and post-cracking stages, behaviour in flexure and shear, Ferro cement - materials, techniques of manufacture, properties and application. Light weight concrete-materials properties and types. Typical light weight concrete mix high density concrete and high performance concrete-materials, properties and applications, typical mix.

REFERENCES:
Neville, A.M. and Brooks, J.J.," CONCRETE TECHNOLOGY", ELBS .1990.
Neville, A.M., "PROPERTIES OF CONCRETE", PITMAN. 1983.
Brandt, A.M., "CEMENT BASED COMPOSITES: Materials, Mechanical Properties and Performance", E & FN Spon. 1995.
Newman, K., "CONCRETE SYSTEMS in COMPOSITE MATERIALS" EDT BY L.Holliday. Elsevier Publishing Company. 1966

SYLLABUS	(SEMESTER-VI)								
Subject Code:	CE6TPE1C	CREDITS: 4			SESSIONAL - TA				ESE
Subject:	Advanced Concrete Design	L	T	P	CT	MSE	TA	TOTAL	
		3	1	-	10	20	10	40	60

UNIT 1: Combined Footings: Simple Rectangular, trapezoidal footings (with and without central beam); Strap footing; raft foundation.

UNIT 2: Types of retaining walls; Cantilever Retaining wall design; Counterfort retaining wall (demonstration only)

UNIT -3: Water tanks resting on ground; Intze type water tank design

UNIT-4: Large span concrete roofs, Introduction– classification- behaviour of flat slabs - direct design and equivalent frame method- codal provisions - waffle slabs.

UNIT-5: Chimneys, analysis of stresses in concrete chimneys- uncracked and cracked sections- codal provisions- design of chimney.

TEXT BOOKS & REFERENCES:

Purushothaman, P., Reinforced Concrete Structural Elements-, Tata McGraw Hill, 1986
Ashok K Jain, Reinforced Concrete –Nem Chand Bros. Roorkee , 1998
Jain and Jaikrishna, Plain and Reinforced Concrete – Vol I and II, NemChand Bros., Roorkee, 2000.
Taylor C Pere, Reinforced Concrete Chimneys, Concrete publications, 1960
Design of deep girders, Concrete Association of India, 1960
Mallick and Gupta, Reinforced Concrete, - Oxford and IBH, 1982
BIS codes (IS 456 , IS 2210, IS 4998, IS 3370, SP 16, SP 24, SP 34).
IRC Codes (IRC 5, IRC 6, IRC 21)
Menon and Pillai, Reinforced Concrete Design

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SYLLABUS	(SEMESTER-VI)								
Subject Code:	CE6TOE1A	CREDITS: 3			SESSIONAL – TA				ESE
Subject:	Construction Planning and Management	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	10	40	60

UNIT 1: Introduction: Objectives and functions of project management, project feasibility reports, Planning for construction projects: Steps, factors, advantages and disadvantages for different stake holder.
Scheduling: Scheduling Job layout and Line of balance, project management through networking, Bar Chart, Linked bar chart, Work-break down structures, Activity-on-arrow diagrams.

UNIT 2: PERT: Network analysis, critical path, probability of project.

UNIT3: CPM: Network analysis, Critical Path,
Difference between CPM and PERT.

UNIT 4: Safety: Importance, causes of Accidents safety measures, responsibility for safety, safety benefits to various parties.
Quality control in construction: Importance, Elements of quality, Characteristics, factors affecting, specification , inspection, quality control circle.

UNIT 5: Time and motion studies, Standard and special equipment, factors affecting selection of construction equipment, cost of owning and operating the construction Equipment,
Excavatory equipment: Mass haul diagram, terms related with excavatory equipment, types, factors for selection, factors affecting output.

TEXT BOOKS:
Construction Engineering and Management – S. Seetharaman (Umesh Publications, New delhi, 1997)
PERT & CPM – Punmia, B.C. and Khandelwal, K.K. (Laxmi Publications, New Delhi 1997)
Construction Management and Planning – Sen Gupta & Guha (Tata McGraw Hill)
Construction planning and management by U K Srivastava

REFERENCE BOOKS:
Construction Planning Equipment and Methods – Peurify/ Schexnayder, 6th Edition (Tata McGraw Hill)
PERT & CPM – Sreenath, I.S. (East West Press, New Delhi, 1975)
Construction Management and Accounts – Vazirani,V.N. & Chandola, S.P. (Khanna Publishers, New Delhi, 2002)
Construction Planning and Management – Gahlot & Dhir (New Age Publishers)

SYLLABUS	(SEMESTER-VI)								
Subject Code:	CE6LPC05	CREDITS: 2			SESSIONAL - TA				ESE
Subject:	Geotechnical Engineering - Lab	L	T	P	CT	MSE	TA	TOTAL	
		-	-	3	-	-	30	30	20

Minimum 10 experiments to be performed

1. Specific Gravity of soil particles.
2. Sieve Analysis.
3. Liquid Limit, Plastic Limit & Shrinkage Limit.
4. Proctor's Standard Compaction Test.
5. Determination of Field Density.
6. Constant Head Permeability Test.
7. Variable Head Permeability Test.
8. Unconfined Compression Test.
9. Triaxial Compression Test (U.U Test).
10. Consolidation Test

Reading:
Soil Mechanics Laboratory Manual.

SYLLABUS	(SEMESTER-VI)								
Subject Code:	CE6LPC06	CREDITS: 2			SESSIONAL - TA				ESE
Subject:	Computer Application in Civil Engg. Lab	L	T	P	CT	MSE	TA	TOTAL	
		-	-	3	-	-	30	30	20

Minimum 10 problems to be solved either by using STAAD Pro/Excel Programming

USING MS EXCEL Programs

1. Analysis of simple beams
2. Design of simply supported RCC beams
3. Design of columns
4. Design of isolated footing (Flat, stepped and sloped)
5. Design of combined footings
6. Design of cantilever retaining walls
7. Design of slabs (one way and Two way)

USING STAAD Pro

8. Analysis of simple beams and Frames (2-D)
9. Analysis of multi storey frames for DL and LL
10. Analysis of multi storey frames for DL, LL, WL/EQL
11. Design of structural elements
12. Analysis and design of combined footing
13. Analysis and design of roof truss
14. Analysis of simple beams for rolling loads

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VII SEMESTER B.TECH. (CIVIL ENGG.)

Sl No	Subject Code	Subjects	Periods /Week			Evaluation Scheme					Grand Total	Credits
						Internal Assessment				E.S.E		
		Theory	L[1]	T[2]	P[3]	C.T[4]	M.S.E[5]	T.A[6]	L.A[7]			
1	CE7TPC17	Water Resources Engineering-II	3	0	0	10	20	10	-	60	100	3
2	CE7TPE2X	Professional Elective -2X	3	1	0	10	20	10	-	60	100	4
3	CE7TPE3X	Professional Elective -3X	3	0	0	10	20	10	-	60	100	3
4	CE7TPE4X	Professional Elective -4X	3	0	0	10	20	10	-	60	100	3
5	CE7TPE5X	Professional Elective -5X	3	0	0	10	20	10	-	60	100	3
6	CE7TOE2X	Open Elective -2X	3	0	0	10	20	10	-	60	100	3
		Practical										
1	CE7LPS01	Seminar	0	0	3	50			50	-	50	2
2	CE7LPS02	Minor project	0	0	8	60			60	40	100	4
										Total Credits		25

X_ indicates the serial alphabet of a subject in the subject group

VIII SEMESTER B.TECH.(CIVIL ENGG.)

Sl No	Subject Code	Subjects	Periods /Week			Evaluation Scheme						Grand Total	Credits
						Internal Assessment					E.S.E		
		Theory	L[1]	T[2]	P[3]	C.T[4]	M.S.E[5]	T.A[6]	L.A[7]	Total			
1	CE8TPC18	Earthquake Resistant Design of structure	3	1	0	10	20	10	-	40	60	100	4
2	CE8TPE6X	Professional Elective -6X	3	0	0	10	20	10	-	40	60	100	3
3	CE8TPE7X	Professional Elective -7X	3	1	0	10	20	10	-	40	60	100	4
4	CE8TOE3X	Open Elective -3X	3	0	0	10	20	10	-	40	60	100	3
		Practical											
1	CE8LPS03	Major Project	0	0	15	120				120	80	200	8
2	CE8LPC07	Structural Detailing Lab	0	0	3	-	-	-	30	30	20	50	2
											Total Credits		24

X_ indicates the serial alphabet of a subject in the subject group
[1]-Lecture Hours, [2]-Tutorial Hours, [3]- Practical Hours, [4]- Mid Sem. Exam, [5]-Class Tests/Assignments, [6]-Lab Work Assessment

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List of Professional (Core) Electives

Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE6TPE1X	Professional Elective-1 (PE Group-1)	4	VI
A	CE6TPE1A	Advanced Concrete Technology		
B	CE6TPE1B	Advanced Surveying		
C	CE6TPE1C	Advanced Concrete Design		
D	CE6TPE1D	Highway Safety		
E	CE6TPE1E	Advanced Fluid Mechanics		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE7TPE2X	Professional Elective-2 (PE Group-2)	4	VII
A	CE7TPE2A	Design of Prestressed Concrete		
B	CE7TPE2B	Structural Dynamics		
C	CE7TPE2C	Theory of Elasticity & Plasticity		
D	CE7TPE2D	Fracture of Concrete Structures		
E	CE7TPE2E	Advance Structural Analysis		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE7TPE3X	Professional Elective-3 (PE Group-3)	3	VII
A	CE7TPE3A	Environmental Geotechnical Engineering		
B	CE7TPE3B	Air Pollution Control Engineering		
C	CE7TPE3C	Industrial Waste Water Management		
D	CE7TPE3D	Water Resources Planning & Management		
E	CE7TPE3E	Environmental Impact Assessment		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE7TPE4X	Professional Elective-4 (PE Group-4)	3	VII
A	CE7TPE4A	Ground Water Hydrology		
B	CE7TPE4B	Ground Improvement Techniques		
C	CE7TPE4C	Geo-Informatics & GIS Applications		
D	CE7TPE4D	Rock Mechanics		
E	CE7TPE4E	Design of Hydraulic Structures		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE7TPE5X	Professional Elective-5 (PE Group-5)	3	VII
A	CE7TPE5A	Industrial Structures		
B	CE7TPE5B	Systems Analysis in Civil Engineering		
C	CE7TPE5C	Railway Engineering		
D	CE7TPE5D	Pavement Construction and Maintenance		
E	CE7TPE5E	Planning & Design of Building Services		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE8TPE6X	Professional Elective-6 (PE Group-6)	4	VIII
A	CE8TPE6A	Machine Foundation		
B	CE8TPE6B	Earthquake Geotechnical Engineering		
C	CE8TPE6C	Bridge Engineering		
D	CE8TPE6D	Solid and Hazardous Waste Management		
E	CE8TPE6E	Construction Equipment & Techniques		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE8TPE7X	Professional Elective-7 (PE Group-7)	3	VIII
A	CE8TPE7A	Air and Water Transportation		
B	CE8TPE7B	Theory of Plates & Shells		
C	CE8TPE7C	Repair and Rehabilitation of Structures		
D	CE8TPE7D	Finite Element Analysis		
E	CE8TPE7E	Hydropower Engineering		

List of Open Electives

Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE6TOE1X	Open Elective-1 (OE Group-1)	3	VI
A	CE6TOE1A	Construction Planning and Management		
B	CE6TOE1B	Rural Technology and Community Development		
C	CE6TOE1C	Engineering System Design Optimization		
D	CE6TOE1D	Engineering System Modelling and Simulation		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE7TOE2X	Open Elective-2 (OE Group-2)	3	VII
A	CE7TOE2A	Value Engineering		
B	CE7TOE2B	Supply Chain Management-Planning		
C	CE7TOE2C	Travel Demand Analysis		
D	CE7TOE2D	Quality Control Assurance and Safety in Construction		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE8TOE3X	Open Elective-3 (OE Group-3)	3	VIII
A	CE8TOE3A	Management Information System		
B	CE8TOE3B	Enterprise Resource Planning		
C	CE8TOE3C	Engineering Risk-Benefit Analysis		
D	CE8TOE3D	Fluid Dynamics		

SYLLABUS
(SEMESTER-VII)

Subject Code:	CE7TPC17	CREDITS: 3			SESSIONAL - TA				ESE
Subject:	Water Resources Engg.-II	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	10	40	60

UNIT 1: Dams: Types of Dams, Forces, failure of dams and criteria for structural stability, principle and shear stress, stability analysis, Elementary profile of a gravity dam, Profile from practical considerations, Openings in dams.

UNIT 2: Spillways and Energy Dissipaters: Introduction, essential requirements of a spillway, spillway capacity, components, Types of spillways, Ogee Spillway, Energy Dissipation below spillways, Types of Energy dissipater, USBR stilling basins

UNIT 3: Diversion Head-works: Introduction, Types of diversion works, location and components, Weir and Barrage, Effect of construction of weir on the river regime, Bligh's creep theory, Theory of seepage flow, Khosla's theory, Vertical drop Weir.

UNIT 4: Regulation Works: Introduction, Definition of falls, necessity and location of falls, comparative study of the main types of falls. Hydraulic Gates: Spillway gates, types, tainter gates, Roller gates.

UNIT 5: Cross Drainage Works: Introduction, suitability, various types of C-D Works, Design principles of C-D Works

NAME OF TEXT BOOKS:
Irrigation Engineering and Hydraulic Structures – S.K. Garg (Khanna Publications)
Irrigation Engineering – B.C. Punmia (Laxmi Publications)

Name of Reference Books:
Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House)
Theory and Design of Irrigation Structures (Volume – I & II) – Varshney (Nem Chand Bros.)
Irrigation Engineering – Asawa G.L. (New Age International Publications)
Fundamentals of Irrigation Engineering – Bharat Singh (Nem Chand & Bros.)
Dams and weirs- William G Bligh, Kessinger Publishing

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SYLLABUS

Subject Code:	CE7TPE2A	CREDITS : 4			SESSIONAL - TA				ESE
Subject:	Design of Prestressed Concrete	L	T	P	CT	MSE	TA	TOTAL	
		3	1	-	10	20	10	40	60

UNIT 1:Introduction: Fundamentals of prestressing - Classification and types of prestressing- Concrete Strength and strain characteristics - Steel mechanical properties - Auxiliary Materials like duct formers.

UNIT 2: Prestressing Systems: Principles of pretensioning and post tensioning - study of common systems of prestressing for wires strands and bars. Losses of Prestress: Losses of prestress in pre tensioned and post tensioned members - I.S. code provisions.

UNIT 3: Analysis of Sections: In flexure, simple sections in flexure, kern distance - cable profile - limiting zones - composite sections cracking moment of rectangular sections. UNIT 4: Design of Simply Supported Beams: Allowable stress as per I.S. 1343 - elastic design of rectangular and I-sections.

UNIT 5: Shear and Bond: Shear and bond is prestressed concrete beams - conventional design of shear reinforcement - Ultimate shear strength of a section - Prestress transfer in pretensioned beams-Principles of end block design.

Reading:

1. Krishna Raju. N "Prestressed Concrete", Tata Mc Graw Hill.
2. Lin.T.Y, "Prestressed concrete", Mc Graw Hill Pub. Co.
3. Rajagopalan, "Prestressed concrete", Narosa Publishing House.

SYLLABUS

Subject Code:	CE7TPE4A	CREDITS: 3			SESSIONAL - TA				ESE
Subject:	Ground Water Hydrology	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	10	40	60

UNIT 1: Hydrologic cycle, Water balance. Occurrence of ground water: Origin, geological formations as aquifers, type of aquifers, groundwater basins, springs. Darcy's Law, validity of Darcy's Law permeability.

UNIT 2: Laboratory and field measurement of permeability, groundwater Flow lines. Steady flow to a well, steady radial flow to a well in confined aquifer and unconfined aquifer, Unsteady radial flow into a confined aquifer, Non equilibrium Theis equation, Theis method of solution, multiple well system; Methods of constructions of deep and shallow wells: The percussion (or cable tool) method of drilling. Direct circulation hydraulic rotary method, Down the hole hammer method, well logs-receptivity logging, testing of wells for yield, Effect of irrigation, stream flow, rainfall on groundwater fluctuations, seasonal and secular variations, fluctuation due to miscellaneous causes;

UNIT 3: Surface and Subsurface investigations of groundwater: Geophysical exploration, Electrical resistivity method, aerial photo interpretation, remote sensing applications to ground water exploration, test drilling. Artificial recharge by water spreading, through pits and shaft, recharge through other methods;

UNIT 4: Ground water pollution: Municipal sources, liquid wastes from domestic uses, solid wastes, industrial sources, tank and pipeline leakage, Mining activity, agricultural sources, septic tank and cesspools, saline water intrusion in coastal aquifers, methods to control saline water intrusion ;

UNIT 5: Groundwater management: Concepts of Basin management, Equation of hydrologic equilibrium, groundwater basin investigations, conjunctive use of surface and groundwater.

TEXT BOOK:
K. C. Patra, Hydrology and Water Resources Engg., Narosa Publishing house, New Delhi.
D. K. Todd, Groundwater Hydrology, John Wiley and Sons.

REFERENCES:
H. M. Raghunath, Ground Water.
S. P. Garg, Groundwater and Tube Wells, Oxford and IBH Publishing Co., New Delhi.
V. T. Chow, Hand book of Applied Hydrology, McGraw-Hill Publishing Company, New York.

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Subject Code:	CE7TPESC	SYLLABUS							
		CREDITS: 3			SESSIONAL - TA				ESE
Subject:	Railway Engineering	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	30	40	60

UNIT 1: Introduction to Railways in India: Role of Indian Railways in National Development – Railways for Urban Transportation –LRT & MRTS. Alignment of Railway Lines: Engineering Surveys for Track Alignment. Permanent Way: Components and their Functions

UNIT 2: Rails - Types of Rails, Length of rail, Weight of Rail, Rail Joints, Creep of rail, Buckling of rail, Kinks of Rail Fastenings. Coning of Wheels& tilting of rails.
Sleepers –Types, Functions, sleeper density
Ballasts- Types, function, advantage & disadvantage of each type.

UNIT 3: Geometric Design of Railway Tracks: Gradients and Grade Compensation, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal Curves.

UNIT 4: Points and Crossings, Turnouts: Working Principles, Cross overs.

UNIT 5: Signalling: Types and their function.
Station and Yards: Types, Requirements, factors for site selection.

Reading:

1. Chandra S. and M.M. Agarwal, Railway Engineering, Oxford University Press, New Delhi, India, 2007.
2. Saxena, S.C. and S.P. Arora, Railway Engineering, Dhanpat Rai and Sons, New Delhi, India, 1997.
3. Agarwal, M.M., Indian Railway Track, Prabha and Co., New Delhi, India, 1988.
4. Rangwala, S.C., Principles of Railway Engineering, Charotar Publishing House, Anand, India, 1988.
5.

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SYLLABUS

Subject Code:	CE7TDE2D	CREDITS: 3			SESSIONAL - TA				ESE
Subject:	Quality Control Assurance and Safety in Construction	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	10	40	60

UNIT 1: Construction Projects: Agencies involved in Construction Projects, mutual relationship, quality control at site; and whose job is it.

UNIT 2: ISO / IS Requirements: IS 9000 (Parts 1 to 4) (Pt 1; 1994, Pt 2; 1993, Pt 3; 1991, Pt 4; 1993) for Total Quality Management. ISO 14000 – 1988 for environment – Impact of large construction projects.

UNIT 3: Quality Control on Construction Projects: Inspection of reinforced concrete, masonry and steel works, testing techniques and quality at reports.

UNIT 4: Statistical Analysis: Sampling frequencies, statistical and reliability analysis, optimum sample size.

UNIT5: Quality Assurance: Quality Assurance in construction.

Name of Text Books:
ISO 9000 in Construction – Nee, Paul A. (Wiley Inter science Publication, 1994)
IS: 14000, – Quality System – Guidelines for Selection and Use of Standards on Quality System 1988.

NAME OF REFERENCE BOOKS:
ISO 9000 in Construction – Wah, L.S., Min., L.C. & Ann, T.W. (McGraw Hill Book Company, 199
Construction Engineering and Management – S. Seetaraman (Umesh Publication)

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SYLLABUS	(SEMESTER-VII)						
Subject Code:	CE7LPS01	CREDITS: 2			SESSIONAL - TA	ESE
Subject:	Seminar	L	T	P	IA	
		-	-	3	50	-

SYLLABUS	(SEMESTER-VII)					
Subject Code:	CE7LPS02	CREDITS:4			SESSIONAL - TA	ESE
Subject:	Minor project	L	T	P	IA	
		-	-	8	60	40

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SYLLABUS					(SEMESTER-VIII)				
Subject Code:	CE8TPC18	CREDITS: 4			SESSIONAL - TA				ESE
Subject:	Earthquake Resistant Design of Structures	L	T	P	CT	MSE	TA	TOTAL	
		3	1	-	10	20	10	40	60

UNIT-I: Elements of structural dynamics, Sources of vibrations; Types of vibrations; Degrees of freedom; Spring action and damping; Free vibration of undamped system having single degree of freedom; Free vibration of viscous damped system having single degree of freedom; Forced vibration of a viscous damped single degree freedom system subjected to harmonic excitation;

UNIT-II: Elements of Earth Quake Ground motion, Earthquake size- Intensity and magnitude; Seismic Zoning-Introduction; Analysis of single storey and single bay RCC Plane Frame (Columns vertical): (As per IS:1893(part-I)). Calculation of lateral force due to earthquake using equivalent static method; Analysis for different load combinations.

UNIT III: Design forces and moments in beam and columns (As per IS:456 and IS13920). Design of column; Design of beam.

UNIT-IV: Ductility factor, Ductility of singly reinforced rectangular beam, Detailing of beam, column, beam-column junction as per relevant IS codes (IS13920). Introduction and basic principle of design of shear wall.

UNIT-V:Masonry Structures :House types and damages, cause and location of damage, Making houses earthquake resistant, Earthquake resistant features, summary of earthquake resistant features, Improving housing designs.

TEXT BOOKS:
Elements of Earthquake Engineering by Jai Krishna, A.R.Chandrasekaran and Brijesh Chandra, Second Edition(1994), South Asian Publishers, New Delhi.
Geotechnical Engineering - S.K.Gulati & Manoj Datta, Tata McGraw-Hill Publishing Company Ltd.
Earthquake Resistant Design of Structures by Pankaj Agarwal, Manish Shrikhande , First edition(2006), Prentice Hall of India Private Ltd., New Delhi .
Earthquakes and Buildings – A.S.Arya, A.Revi, Pawan Jain
CODES: IS:1893(part-I), IS13920, IS:456-2000, SP34

REFERENCE BOOK
Dynamics of Structures by A.K.Chopra, Second edition (2001), Prentice Hall India Private Ltd

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SYLLABUS									
Subject Code:	CE8TPE6D	(SEMESTER-VIII) CREDITS: 3			SESSIONAL - TA				ESE
Subject:	Solid and Hazardous Waste Management	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	10	40	60

UNIT-1: Municipal Solid Waste Management: Legal and Organizational foundation: Definition of solid waste – waste generation technological society – major legislation, monitoring responsibilities, sources and types of solid waste – sampling and characterization – Determination of composition of MSW – storage and handling of solid waste – Future changes in waste composition.

UNIT-2: Collection and Transport of Solid Waste: Collection of Solid Waste: Type of waste collection systems, analysis of collection system –alternative techniques for collection system. Separation and Processing and Transformation of Solid Waste: UNIT operations user for separation and processing, Materials Recovery facilities, Waste transformation through combustion and aerobic composting, anaerobic methods for materials recovery and treatment – Energy recovery – Incinerators Transfer and Transport: Need fir transfer operation, transport means and methods, transfer station types and design requirements. Landfills: Site selection, design and operation, drainage and leachate collection systems – requirements and technical solution, designated waste landfill remediation – Integrated waste management facilities.

UNIT-3: Hazardous Waste Management: Definition and identification of hazardous wastes-sources and characteristics – hazardous wastes in Municipal Waste – Hazardous wastes regulations – minimization of Hazardous Waste-compatibility, handling and storage of hazardous waste-collection and transport, e-waste sources, collection, treatment and reuse management.

UNIT-4: Hazardous waste treatment and Design: Hazardous waste treatment technologies - Design and operation of facilities for physical, chemical and thermal treatment of hazardous waste – Solidification, chemical fixation and encapsulation, incineration. Hazardous waste landfills: Site selection, design and operation – remediation of hazardous waste disposal sites.

UNIT-5: Laboratory Practice: Sampling and characterization of Solid Wastes; TCLP tests and studies. leachate

REFERENCES:

George Techobanoglous et al, "Integrated Solid Waste Management", McGraw-Hill Publication, 1993.
Charles A. Wentz; ""Hazardous Waste Management", McGraw Hill Publication, 1995.

SYLLABUS										
Subject Code:	CEBTPE7A	(SEMESTER-VIII) CREDITS: 4								
Subject:	Air and water transportation	L	T	P	SESSIONAL - TA				ESE	
					CT	MSE	TA	TOTAL		
		3	1	-	10	20	10	40	60	

UNIT 1: Air Transportation: Aircraft Characteristics - Landing gear configurations, aircraft weight, engine types, Aircraft performance characteristics: speed, payload and range, runway performance, declared distances, wingtip vortices.

UNIT 2: Geometric Design of the Airfield - Airport classification, Runways, wind rose, estimating runway length, sight distance and longitudinal profile, transverse gradient, Taxiways and taxi lanes: design of taxiway curves and intersections, end-around taxiways, Aprons: holding aprons, terminal aprons and ramps, surface gradients, Control tower visibility requirements.

UNIT 3: Structural Design of Airport Pavements - Soil investigation and evaluation, FAA pavement design methods. Airport Lighting, Marking, and Signage. Terminal Area - Passenger terminal system and its components, Apron gate system: number of gates, gate size, aircraft parking type, apron layout, apron circulation, passenger conveyance to aircraft.

UNIT 4: Water Transportation: Ports and Harbours - Types of water transportation, water transportation in India, Ports and harbours: requirements, classification, ship characteristics, Harbour works: breakwaters, jetties, fenders, piers, wharves, dolphins, etc., Navigational aids: types, requirements, light house, beacon lights, buoys, Port facilities: general layout, development, planning, facilities, terminals.
Docks, Dredging, Coastal Erosion and Protection.

UNIT 5: Docks and repair facilities: design, dry docks, wet docks, slipways, Locks and lock gates: materials, size, Dredging: classification, dredgers, uses of dredged materials, Coastal erosion and protection: seal wall, revetment, and bulkhead.

Reading:

1. Ashford, N. J., Mumayiz, S. A., and Wright, P. H. Airport Engineering: Planning, Design and Development of 21st Century Airports, Fourth Edition, John Wiley & Sons, New Jersey, USA, 2011.
2. Horonjeff, R., McKelvey, F. X., Sproule, W. J., and Young, S. B. Planning and Design of Airports, Fifth Edition, McGraw-Hill, New York, USA, 2010.
3. Kazda, A., and Caves, R. E. Airport Design and Operation, Second Edition, Elsevier, Oxford, U.K., 2007. ,
4. Khanna, S. K., Arora, M. G., and Jain, S. S. Airport planning and Design, Sixth Edition, Nem Chand and Bros, Roorkee, India, 2012. ,
5. Kumar, V., and Chandra, S. Air Transportation Planning and Design, Galgotia Publications Pvt. Ltd., New Delhi, India, 1999. ,
6. Neufville, R. D., and Odoni, A. Airport Systems: Planning, Design, and Management, McGraw-Hill, New York, USA, 2003. ,
7. Young, S. B., and Wells, A. T. Airport Planning and Management, Sixth Edition, McGraw-Hill, New York, USA, 2011. ,
8. Bindra, S.P. A Course in Docks and Harbour Engineering, Dhanpat Rai and Sons, New Delhi, India, 1992. ,
9. Seetharaman, S. Dock and Harbour Engineering, Umesh Publications, New Delhi, India, 1999. ,
10. Srinivasan, R. Harbour, Dock and Tunnel Engineering, Charotar Publishing House, Anand, India, 1987.

SYLLABUS (SEMESTER-VIII)

Subject Code:	CEBTOE3A	CREDITS: 3			SESSIONAL - TA				ESE
Subject:	Management Information System	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	10	40	60

UNIT 1: Management and System- Advance in management, the process of MIS development, MIAS organization, Information dynamics.

UNIT 2: Planning, Design and implementation of MIS, Strategic planning, MIS design- Group design concepts, Acquiring information system.

UNIT 3: System life cycle-Information flow, Entity relationship modelling, data modelling, detailed process analysis, data flow diagrams.

UNIT 4: Decision making system with MIS, System concepts for MIS.

UNIT 5: Data information and communication, problem solving and decision making, security, control and failure, Future trends in MIS.

TEXT BOOKS:

Management Information Systems, by S. Sadagopan, PHI Learning Pvt. Ltd
Management Information Systems By . Chatterjee, PHI Learning Pvt. Ltd
Management Information Systems (11th Edition), by Ken Laudon and Jane Laudon

SYLLABUS							
Subject Code:	CEBLP503	(SEMESTER-VIII)					
		CREDITS: 8			SESSIONAL - TA		ESE
Subject:	Major Project	L	T	P	IA	TOTAL	
		-	-	15	120	120	80

SYLLABUS									
Subject Code:	CE8LPC07	(SEMESTER-VIII)							
Subject:	Structural Detailing Lab	CREDITS: 2			SESSIONAL - TA				ESE
		L	T	P	CT	MSE	TA	TOTAL	
		-	-	3	-	-	30	30	20

Part A: (Steel Structures)

1. Detailing of Tension Members.
2. Detailing of Built up Compression Members.
3. Detailing of Column Bases.
4. Detailing of connections.
5. Detailing of an Industrial shed.
6. Detailing of a Plate girder/Gantry girder.

Part B: (Reinforced Concrete Structures)

1. Details of reinforcement in RCC Continuous Beams.
2. Details of reinforcement for RCC column with isolated footings.
3. Details of reinforcement in a one way/two way slabs.
4. Details of reinforcement in stair cases.
5. Detailing of Combined footings.
6. Detailing of Retaining walls/Water Tanks.