Department: Department of Civil Engineering   **Rev:** Course Structure   /00/2021-22

Class: S.Y. B. Tech.   **Semester:** III

Course Code	Type of Course	Course	Teaching Scheme				Evaluation Scheme					Credits
			L	T	P	Total hrs.	CA1	CA2	MSE	ESE	Total	
CE301	BSC	Engineering Mathematics-III	3	1	-	4	10	10	30	50	100	4
CE302	PCC	Building Material, Construction & Maintenance	2	-	-	2	10	10	30	50	100	2
CE303	ESC	Strength of Materials	3	-	-	3	10	10	30	50	100	3
CE304	PCC	Surveying-I	3	-	-	3	10	10	30	50	100	3
CE305	ESC	Hydraulics-I	3	-	-	3	10	10	30	50	100	3
CE306	PCC	Building Material, Construction & Maintenance Laboratory	-	-	2	2	25	25	-	-	50	1
CE307	ESC	Strength of Materials Laboratory	-	-	2	2	25	25	-	-	50	1
CE308	PCC	Surveying-I Laboratory	-	-	2	2	15	15	-	20	50	1
CE309	ESC	Hydraulics-I Laboratory	-	-	2	2	15	15	-	20	50	1
MDC01	MC	Constitution of India	1	-	-	1	25	25	-	-	50	Audit
HMS01	HSMC	Aptitude Skills-I	1	-	-	1	25	25	-	-	50	1
HMS02	HSMC	Language Skills-I	-	-	2	2	25	25	-	-	50	Audit
PRJ02	PROJ	Mini Project - II	-	-	2	2	25	25	-	-	50	Audit
TOTAL			**16**	**1**	**12**	**29**	**230**	**230**	**150**	**290**	**900**	**20**

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Engineering Mathematics-III

CE301	BSC	Engineering Mathematics-III	3-1-0	4 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs/week Tutorial: 1hr/week	Continuous Assessment-I : 10 Marks Continuous Assessment-II : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

Pre-Requisites: Engineering Mathematics-I & II

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

CO1	Develop basic mathematical tools for fitting of curves like linear and non-linear curve and regression.
CO2	Apply discrete and continuous probability distributions to various engineering problems.
CO3	Apply the definition & properties of Laplace Transform to evaluate the integral & to find Laplace transform of elementary functions and special functions like periodic function, Dirac-delta function & unit step function.
CO4	Apply the knowledge of Laplace transformation to find solution of linear Differential equations with constant coefficient.
CO5	Solve partial differential equations & use of separation of variable method to solve heat and Laplace equations.
CO6	Develop the concept of Fourier series expansion of different periodic functions so as to use them in harmonic analysis.

Course Content

Unit 1: Curve Fitting Lines of regression of bi-variate data, Fitting of Curves by method of Least- squares-Fitting of Straight lines, Fitting of Parabola & Fitting of exponential curves.	[6]
Unit 2: Probability Distributions Random variable, Probability mass function, Probability density function Binomial distribution, Poisson distribution & Normal distribution.	[6]
Unit 3: Laplace Transform Definition – conditions for existence ; Transforms of elementary functions ; Properties of Laplace transforms - Linearity property, first shifting property, second shifting property, transforms of functions multiplied by t^n, scale change property, transforms of functions divided by t, transforms of derivatives ; Evaluation of integrals by using Laplace transform ; Transforms of some special functions- periodic function, Heaviside-unit step function, Dirac delta function	[8]

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Unit 4: Inverse Laplace Transform Introductory remarks ; Inverse transforms of some elementary functions ; General methods of finding inverse transforms ; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms ; Applications to find the solutions of linear differential equations and simultaneous linear differential equations with constant coefficients	[7]
Unit 5: Partial Differential Equations and Their Applications Formation of Partial differential equations by eliminating arbitrary constants and functions; Equations solvable by direct integration; Linear equations of first order (Lagrange's linear equations); Method of separation of variables – applications to find solutions of one dimensional heat flow equation ($\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$), and two dimensional heat flow equation (i.e. Laplace equation ; $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$).	[8]
Unit 6: Fourier series Definition, Euler's formulae, Conditions for a Fourier expansion, Function shaving points of discontinuity, change of interval, expansions of odd and even periodic functions and half range series.	[7]

Text books: 1. P. N. Wartikar & J. N. Wartikar, A Text Book of Applied Mathematics (Vol I & II), Pune Vidyarthi Griha Prakashan, Pune. 2. N. P. Bali, A Text Book of Engineering Mathematics, Laxmi Publications, New Delhi.
Reference books: 1. C. R. Wylie & L. C. Barrett, Advanced Engineering Mathematics, McGraw Hill Publishing Company Ltd. 2. B. V. Ramana, Higher Engineering Mathematics, McGraw-Hill Publications, New Delhi. 3. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers. 4. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons. 5. Peter O" Neil, A Text Book of Engineering Mathematics, Thomson Asia Pvt. Ltd., Singapore.

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Sharad Institute of Technology College of Engineering
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur
(An Autonomous Institute)

Building Material, Construction and Maintenance

CE302	PCC	Building Material, Construction and Maintenance	2-0-0	2 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs./week	Continuous Assessment 1 : 10 Marks Continuous Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

Pre-Requisites: Basic Civil Engineering

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

CO1	Explain current & future of buildings concepts.
CO2	Summarize the building materials and their properties.
CO3	Outline for different types of foundations, columns, beams & masonry constructions.
CO4	Illustrate the requirements and different types of openings and stairs.
CO5	Demonstrate various patterns of floors & Roofs.
CO6	Identify finishing materials & various maintenance techniques.

Course Content

Unit 1: Concept of Building History, Definition, Types, load bearing & framed Structure, loads on building, current problems, future of buildings, sustainability of building, Basic requirements of a building as a whole	[04]
Unit 2: Construction Materials Genesis, Engineering properties, field testing & Applications of Stone, Brick, Lime and Cement, Mortar, Steel, Timber, Tiles, Specifications as per IS code provisions.	[04]
Unit 3: Foundation, Columns, Beams & Walls **Foundation:** Details of Stepped, isolated, combined, strip, raft, strap or cantilever & pile foundation. **Columns:** Definition, Function and types of columns. **Beams:** Types according to material, layout such as primary and secondary, continuous beams, formwork for RCC elements: function, requirements. **Walls:** Structural and Functional requirements, Types of Units and Mortars and their properties, Factors affecting strength and stability of walls, Functions of wall in buildings, Construction joints in masonry, Types: Stone masonry, Brick masonry, Concrete Block masonry, Types of Bonds, Procedure for construction of walls, Strength and stability of walls.	[06]
Unit 4: Openings & Stairs **Doors:** classification based on parameters such as material, geometry, fixtures and fastening. **Windows:** classification based on parameters such as material, geometry, fixtures and fastening, Use of composite materials for doors and window frames and shutters, lying out of passages. **Stairs:** Terminology, requirements of a good stair, various types, uses and limitations **Ramps:** Requirements and types, planning aspects for physically handicapped persons **Elevators:** Types and their Use	[06]

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Unit 5: Floors &Roofs **Floors:** Definition, Different types of floors – Concrete, Mosaic, and Terrazzo floors. **Roofs:** Definitions, Load considerations, Requirements of good roofs, Types of Sloped roofs, Types of Flat roof/floor, Roof covering materials, Formwork, Application of DPC, Joints in construction	[05]
Unit6: Finishing Damp Proofing and Water Proofing Materials and uses – Plastering, white washing and distempering. Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. Form Works and Scaffoldings	[03]

Text Books:
1. Punmia B.C., Jain A. K., "Building Construction", Laxmi Pub. Pvt. Ltd., 10th Edi, N. Delhi
2. Arora S. P. and Bindra S. P., "Text Book of Building Construction", Dhanpat Rai Publications
3. Kumar Sushil, "Building Construction" Standard Publishers, 20th Edition, 2010.
4. P. Purushothama Raj, "Building Construction Materials and Techniques", Pearson Education
5. Jain V.K., "Automation Systems in Smart and Green Buildings" ISBN NO: 978-81-7409-237-3

Reference Books:
1. NBC 2005, National Building Code of India, Parts III, IV, VII and IX, B.I.S. New Delhi
2. Chudley R., "Construction Technology", Vol.1, 2, 3 and 4 ELBS Publisher
3. SP 7- National Building Code Group 1 to 5, B.I.S. New Delhi
4. I.S. 962 - 1989 Code for Practice for Architectural and Building Drawings, B.I.S. New Delhi
5. Sikka V. B., "A Course in Civil Engineering Drawing", S. K. Kataria and Sons
6. Catalogues. Information Brochures, Trade Literature by material or product manufacturers
7. Mehta, Scarborough, Armpriest, "Building Construction", Pearson Education
8. Macay W.B, "Building Construction", Vol. I, II, III, IV, Pearson Education
9. Jain V.K., "Handbook of Designing and Installation of Services in High Rise Building Complexes" ISBN : 978-81-7409-245-8

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Strength of Materials

CE303	ESC	Strength of Materials	3-0-0	3 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs/week	Continuous Assessment1 : 10 Marks Continuous Assessment 2 :10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

Pre-Requisites: Engineering Mechanics

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

CO1	Explain the concept of stress and strain.
CO2	Illustrate the shear force, bending moment and Develop the SFD, BMD for determinate beam.
CO3	Explain the concept of torsion for circular shaft and thin cylinder.
CO4	Illustrate the bending stresses in the beam.
CO5	Illustrate the shear stresses in the beam.
CO6	Analyze the combined direct and bending stresses for column, dam and retaining wall.

Course Content

UNIT-1 Stress-Strain Engineering properties of different materials, Simple stress and strain, Hook's law, Elastic behavior of the body under external actions, Elastic constants and their relation, Temperature stresses, Composite Sections, Normal stress and strain in three dimensions.	[6]
UNIT-2 Shear force and Bending moment Introduction, Types of beams, supports and loading, Sign conventions for bending moments and shear forces, Relation between shear force, bending moment and intensity of loading, Shear force diagram and bending moment diagram for concentrated loads, uniformly distribution load and uniformly varying load in simply supported beam, cantilever beam, overhanging beam.	[8]
UNIT-3: Torsion and Thin cylinder Torsion- Theory of torsion, Assumptions, Derivation of torsion formula, Stress, strain and deformation in determinate and indeterminate shafts of solid, hollow, homogeneous and composite cross-section subjected to twisting moment, Power transmitted through shaft. Thin Cylinder- Theory of thin cylinder. Thin cylinder subjected to internal fluid pressure, circumferential stress, Longitudinal stress, Concept of Efficiency of joint, Wire winding of thin cylinder.	[6]
UNIT 4: Bending stresses Concept of moment of inertia for various cross-sections, Theory of pure bending, Derivation of flexural formula, Moment of resistance, Simple design problems for rectangular and flanged sections, Concept of flitch beam.	[7]
UNIT 5: Shear stress Concept of shear, Derivation of shear stress formula, Stress distribution diagram for standard sections,	[7]

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Maximum and average shear stress for circular and rectangular sections, Design problems for rectangular & flanged sections	
UNIT 6: Direct and Bending stress Concept of direct and bending stress, columns subjected to eccentric loading, core of section, chimney subjected to wind pressure. Concept of earth retaining wall & stability of dam.	[6]

Text books:
1. Junnarkar S.B. (2014), "Mechanics of Structures", Charotor Publishers, Anand, 31st edition,
2. Khurmi R.S., "Strength of Material", S. Chand and Co., Edition revised 1968, New Delhi
3. Ramamrutham S., "Strength of Materials", Dhanpatrai and Sons, Delhi

Reference books:
1. Punmia B. C., "Mechanics of Materials" Laxmi Publications, revised edition, 2016
2. Subramanian R., "Strength of Materials" Oxford University Press, 2nd edition, New Delhi
3. F. L. Singer and Pytel, "Strength of Material" Harper and Row publication.
4. J.B. Popov, Prentice, "Introduction to Mechanics of Solids" Hall publication.
5. James M. Gere, "Mechanics of Materials", Brooks/Cole. Publishing Co.,6th edition, 2008.

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Surveying-I

CE304	PCC	Surveying-I	3-0-0	3 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs./week	Continuous Assessment 1 : 10 Marks Continuous Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

Pre-Requisites: Basic Civil Engineering

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

CO1	Make use of the instrument and methods required for recording the field measurement.
CO2	Identify the instrument, methods used in angular measurements and errors involved
CO3	Deduce the reduced level by recording in page of level book and make its use to prepare the contour lines by indirect method
CO4	Apply the methods used to determine the area
CO5	Demonstrate the Theodolite for its various applications in surveying.
CO6	Understand the procedural part of preparing gales table for traverse plotting

Course Content

Unit 01: Linear measurement Introduction –Principles of surveying, Types of survey, Instrument used , Terms in chain surveying (field book recording), Chaining, ranging and offsetting instrument required, plan and map scale, problems on scale and errors,	[6]
Unit 02: Angular measurement Instruments used for angular measurement such as prismatic campus and surveyor's campus -Terms used in compass surveying, Conversion of WCB and RB , concept of traverse its suitability, problems on included angles, identification of local attraction and reasons	[5]
Unit 03: Leveling and contouring Terms used in Leveling and contouring ,Types of leveling ,Method of reduction of levels ,Temporary adjustment and permanent adjustment, Method of contouring ,interpolation ,contour plotting , Problems on leveling ,Introduction to leveling instrument (dumpy ,auto)	[7]
Unit 04: Area and Volume Calculation Methods used for area calculation, Instrument used for area calculation, problems on planimeter , capacity contouring ,plane table survey ,principle, methods,	[5]
Unit 05: Theodolite Surveying Introduction to Theodolite –components (parts), temporary adjustments Application of Theodolite – Measurement of horizontal angle by direct method, repetition method, reiteration method and vertical angle method, single plane trigonometric leveling	[7]

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Unit 06: Theodolite Traversing Methods of traversing, check used in traversing, Preparation of Gale's table and transverse plotting, cases of omitted measurement.	**[6]**

Text Books:
1. Kanetkar T.P. and Kulkarni S.V. "Surveying and Levelling – Part1", Pune Vidyarthi Grih Prakashan, Pune.
2. Kanetkar T.P. and Kulkarni S.V. "Surveying and Levelling – Part2", Pune Vidyarthi Grih Prakashan, Pune.

Reference Books
1. Duggal S. K. "Surveying Volume I", Tata McGraw-Hill Publishing Company Limited.
2. Duggal S. K. "Surveying Volume II", Tata McGraw-Hill Publishing Company Limited.
3. Bannister A, Raymond S & Baker R. "Surveying", Pearson Education Ltd.
4. Subramanium R., "Surveying & Levelling", Oxford University Press. 52
5. Clark David, "Plane and Geodetic Surveying for Engineers Volume–I", CBS, 6/E.
6. Clark David, " Plane and Geodetic Surveying for Engineers Volume –II", CBS, 6/E
7. Punmia B. C., Jain A, Jain A., "Surveying-II", Laxmi Publications (P) Ltd. New Delhi.
8. IRC:38:1988, Guidelines for design of horizontal curves for highways and design table
9. IS:11134-1984, Code of practice for setting out of buildings

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Hydraulics - I

CE305	ESC	Hydraulics - I	3-0-0	3 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs./week	Continuous Assessment 1 : 10 Marks Continuous Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

Pre-Requisites:

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

CO1	Tell importance of various fluid properties
CO2	Identify the various flow measuring device
CO3	Differentiate types of flow and understand the concept of flow net
CO4	Make use of general governing equations for various fluid flows
CO5	Summarize fundamentals of pipe flow, losses in pipe and analysis of pipe network
CO6	Solve fluid problems with dimensional analysis

Course Content

Unit 1: Introduction ,properties of fluid –density ,specific weight ,specific gravity ,specific volume ,viscosity ,compressibility ,bulk modulus ,surface tension ,capillarity ,vapour pressure and cavitation	[6]
Unit 2: A) Buoyancy and flotation – Archimedes Principle , Metacentre ,Stability of submerged and floating bodies B) Pressure and its measurement – Fluid pressure at a point , Pascals law, Hydrostatic law, types of pressure ,measurement of pressure using simple differential and inclined manometer. Hydrostatic forces on surface –total pressure and center pressure , total pressure on plan surface ,total pressure on curved surface.	[7]
Unit 3: Types of fluid flow, stream line, path line, continuity equation, velocity and acceleration, velocity and potential function and stream function, concept of flow net	[5]
Unit 4: Equations of motion, Eulers equation of motion, Bernoulli's equation, Practical application of Bernoulli's equation. Time required for emptying tank ,concept of HGL ,TEL	[6]
Unit 5: Reynold's experiment, Hazen Poisulle's equation for viscous flow through circular pipes, Major and Minor losses, Concept of equivalent pipe ,Dupit's equation ,Pipes in series, Parallel and Syphon.	[7]
Unit 6: Dimensional Analysis Nature of dimensional analysis ,Rayleigh's method ,Buckingham pi	[5]

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theorem ,dimensionless groups and their physical significance ,flow similarity and model studies ,scale effects ,distorted and undistorted model.

Text Books

1. Fox. R. W. and Mc-Donald. A. T., "Introduction to Fluid Mechanics", John Wiley and Sons, Fifth Edition
2. Modi and Seth, "Fluid Mechanics and Hydraulic Machinery", Standard Book House, Tenth Edition , 1991
3. Kumar K. L., "Fluid Mechanics"
4. Bansal R. K., "Fluid Mechanics"
5. Jain A.K, "Fluid Mechanics including Hydraulic Machines" ISBN: 978-81-7409-194-7

Reference Books:

1. Streeter V. L., Bedford K. W. and Wylie E. B., "Fluid Dynamics", New York, McGraw-Hill, Ninth Edition, 1998
2. Som S. K. & Biswas G., "Introduction to Fluid Mechanics & Fluid Machines", Tata McGraw-Hill, 2nd Edi., 2003

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Building Material, Construction and Maintenance Laboratory

CE306	PCC	Building Material, Construction and Maintenance Laboratory	0-0-2	1 Credit

Teaching Scheme:	Examination Scheme:
Practical: 2 hr/week	Continuous Assessment 1 : 25 Marks
	Continuous Assessment 2 : 25 Marks

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

CO1	Make use of different lettering and symbols in drawing.
CO2	Show the various components of building as per scale.
CO3	Design of staircase along with scaled drawing.
CO4	Compare the rates of building material from market.

Course Content

(A) Lettering, Symbols, Types of lines and dimensioning as per IS 962

(B) Drawing to a scale, draw on half imperial drawing sheet.

 1) Stone masonry: UCR, Course rubble

 2) Brick masonry: English bond, Flemish bond.

 3) Doors: T.W. Paneled door

 4) Windows: T.W. Glazed and aluminum Window

 5) Lintels, Arches, Truss

 6) Design and drawing of staircase.

(C) Site visits (minimum two) and detailed report.

(D) Report on market survey about building material.

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Strength of Materials Laboratory

CE307	ESC	Strength of Materials Laboratory	0-0-2	1 Credit

Teaching Scheme:	Examination Scheme:
Practical: 2 hr/week	Continuous Assessment1: 25 Marks
	Continuous Assessment 2: 25 Marks

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

CO1	Determine the various properties of metals.
CO2	Determine the compression strength of timber.
CO3	Determine the compression strength of brick.

Practical Work consists of performance of at least eight experiments from the list below

1. Introduction to Strength of material laboratory.
2. Tensile test on mild steel / aluminum.
3. Compression test on mild steel/aluminum.
4. Shear test on mild steel/aluminum (Single and Double shear test).
5. Torsion test on mild steel and solid bars.
6. Flexural test on timber, mild steel beams.
7. Impact test on mild steel, brass, aluminum and specimens.
8. Hardness test on metals.
9. Compression test on timber & brick.

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Surveying-I Laboratory

CE308	PCC	Surveying-I Laboratory	0-0-2	1 Credit

Teaching Scheme:	Examination Scheme:
Practical: 2 hr/week	Continuous Assessment 1 : 15 Marks Continuous Assessment 2 : 15 Marks End Semester Exam : 20 Marks

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

CO1	Make use of surveying equipment such as chain, tape, compass, theodolite for obtaining field data in preparing the plan.
CO2	Make use of leveling instrument in determining the elevation of ground points
CO3	Make use of the planimeter in calculating the area of any regular and irregular figure
CO4	Demonstrate use of the Theodolite for its major applications
CO5	Plan a Theodolite traverse survey to formulate the gales table by calculating the independent co-ordinates to balance the traverse
CO6	Make use of elevation of points and do the interpolation to prepare the contour map of plane terrain

Experiments

1. Experiment on chaining , ranging, offsetting
2. Experiment on compass traversing
3. R L determination by rise and fall method and collimation plane method
4. Use of digital planimeter
5. Study of Theodolite
6. Measurement of vertical angle
7. Measurement of horizontal angle by direct method
8. Measurement of horizontal angle by repetition method
9. Measurement of vertical angle
10.Single plane trigonometric leveling

Projects

1. Block Contouring
2. Theodolite Traversing

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Hydraulics – I Laboratory

CE309	ESC	Hydraulics – I Laboratory	0-0-2	1 Credit

Teaching Scheme:	Examination Scheme:
Practical: 2 hr/week	Continuous Assessment 1 : 15 Marks Continuous Assessment 2 : 15 Marks End Semester Exam : 20 Marks

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

CO1	Experiment with the various flow measuring devices.
CO2	Determine the properties of fluid and pressure and their measurement.
CO3	Interpret fundamentals of pipe flow, losses in pipe and analysis of pipe network.
CO4	Illustrate fluid flow phenomena observed in Civil Engineering systems.

Term Work:
Practical Work consists of performances among the list below
List of experiments (Any 8)

1) Measurement of Viscosity of various fluids
2) Demonstration of working of different types of valves and pipe fittings
3) Measurement of pressure Piezometer, manometers, Pressure gauges
4) Measurement of discharge - Calibration of measuring tank, Use of hook or point gauge.
5) Verification of Bernoulli's Theorem
6) Determination of metacentric height.
7) Calibration of an orifice / mouthpiece / venturimeter / orifice meter
8) Study of factors affecting coefficient of friction for pipe flow (for two different materials and two different diameters)
9) Determination of loss of head due to Pipe Fittings

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Constitution of India

MDC01	MC	Constitution of India	1-0-0	Audit

Teaching Scheme:	Examination Scheme:
Lecture: 1 hrs/week	Continuous Assessment 1: 25 Marks Continuous Assessment 2: 25 Marks

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

CO1	Understand the evolution of Indian Constitution
CO2	Understand the Fundamental Rights and Directive Principles
CO3	Understand the Government of the Union
CO4	Understand the Government of the State
CO5	Understand the Indian Judiciary System
CO6	Understand various Constitutional Bodies

Course Content

Unit 1: Evolution of Indian Constitution Historical background, Making of Indian Constitution, Salient features of Indian Constitution, Sources of Indian Constitution, Preamble of the Indian Constitution, Significance of the Preamble	[6]
Unit 2: Fundamental Rights and Directive Principles Features of Fundamental Rights, Laws inconsistent with the Fundamental Rights, Right to Equality, Freedom, Right against exploitation, Freedom of Religion, Cultural & Educational Rights, Right of Constitutional remedies, and Writs, Directive Principles of Sate Policy	[7]
Unit 3: Government of the Union President of India – Election and Powers, Prime Minister and Council of Ministers, Lok Sabha – Composition and Powers, Rajya Sabha – Composition and Powers, Federal System of India Center-State relations, Emergency Provisions	[7]
Unit 4: Government of the States Governor – Appointment & Powers, Chief Minister and Council of Ministers, Legislative Assembly – Composition and powers, Legislative Council – Composition and powers, Panchayat Raj Institutions, Municipal Corporations	[6]
Unit 5: The Judiciary Features of judicial system in India, Supreme Court –Structure and seat, Organization & Procedure of Supreme Court jurisdiction of Supreme Court, High Court – Structure and jurisdiction, Independence of High Court, Subordinate Courts	[7]
Unit 6: Constitutional Bodies Election Commission, UPSC, SPSC, Finance Commission of India, Comptroller and Accountant General of India, Attorney General of India, Advocate General of State	[7]

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Aptitude Skills - I

HMS01	HSMC	Aptitude Skills - I	1-0-0	1 Credit

Teaching Scheme:	Examination Scheme:
Lecture: 1 hrs/week	Continuous Assessment 1: 25 Marks Continuous Assessment 2: 25 Marks

Pre-Requisites: Communication Skills

Group A (CSE,E&TC,AI&DS,Electrical)

Aptitude (12Hrs) (Compulsory)

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

CO1	Understand speed math techniques to solve aptitude problems
CO2	Summarize number systems in detail.
CO3	Explain basic aptitude techniques related to Percentage, Average, Ratio Proportion and Fraction
CO4	Understand speed, time and distance concepts
CO5	Summarize the concepts of Business aptitude using basic aptitude
CO6	Solve the aptitude problems on Geometry and Venn Diagram

Course Content

Unit 1: Speed Math Techniques Multiplication, Squares, Square roots, Cubes, Cube roots	[1]
Unit 2: Number System Types of Number System, Last Digit Method, BODMAS Calculation, HCF and LCM, Progressions	[2]
Unit 3: Basic Aptitude Percentage, Average, Ratio and Proportion, Fraction, Partnershi	[3]
Unit 4: Speed- Time- Distance Speed, Time, and Distance, Trains, Boats, Streams, Races	[2]
Unit 5: Business Aptitude Profit & Loss, Simple Interest, Compound Interest	[2]
Unit 6: Geometry and Venn Diagram 2D and 3D Mensuration, Venn diagram	[2]

Text Books:
1. Arun Shrama - Quantitative aptitude for CAT.
2. RS Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S. Chand Publisher; 2016 edition
3. RS Aggarwal, Quantitative Aptitude for Competitive Examinations, S. Chand Publisher; 2016

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edition

Reference Books:
1. Fast Track Objective Arithmetic Paperback, by Rajesh Verma – 2018
2. Teach Yourself Quantitative Aptitude, Arun Sharma
3. The Pearson Guide To Quantitative Aptitude For Competitive Examination by Dinesh Khattar

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Group B (Civil,Mech.,Mechatronics)

Verbal Ability (12Hrs) (Compulsory)

Pre-Requisites: Communication Skills
Course Outcomes: At the end of the course, students will be able to:

CO1	Understand basic concepts of sentences and its structure
CO2	Understand the tenses and its use in daily life
CO3	Explain basic uses of speeches and voices in day to day life
CO4	Understand the use of modal verbs in sentence construction
CO5	Summarize various Phrases, Idioms and Proverbs
CO6	Summarize different words used in daily life

Course Content

Unit 1: English Grammar Structure and Types of Sentence, Conditional Sentences	[2]
Unit 2: Tenses Present tense, Past tense, Future tense, Use of Tenses in Sentence forming	[2]
Unit 3: Speeches and Voices Direct and Indirect Speech, Active and Passive Voice	[2]
Unit 4: Moda Use of Modal verbs in Sentence Forming, Substitution and Elimination	[2]
Unit 5: Proverbs, Idioms and Phrases Use of Proverbs, Idioms and Phrases in Sentence Construction, Judgment and Inference Sentence	[2]
Unit 6: Vocabulary Vocabulary Building in Various Situations	[2]

Text Books:
1. Raymond Murphy, Essential English Grammar with Answers, Murphy
2. Objective General English by R.S. Aggarwal, S Chand Publishing; Revised edition (15 March2017)

Reference Books:
1. Rao N,D,V,Prasada, Wren & Martin High School English Grammar and Composition Book, S Chand Publishing, 2017
2. Murphy, Intermediate English Grammar with Answers, Cambridge University Press; Second edition

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Language Skills- I

HMS02	HSMC	Language Skills- I	0-0-2	Audit

Teaching Scheme:	Examination Scheme:
Practical: 2 hrs/week	Continuous Assessment 1: 25 Marks
	Continuous Assessment 2: 25 Marks

C Programming (Technical Language) (24Hrs)
Syllabus for C Programming

Pre-Requisites: Communication Skills

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

CO1	Explain fundamentals & essentials of C programming.
CO2	Illustrate Types, Operators and Expressions.
CO3	Make use of Decision Making and Looping Statements
CO4	Make use of Arrays in C programming.

Course Content

Unit 1: Basics of C Editing, Compiling, Error Checking, executing, testing and debugging of Programs, Flowcharts, Algorithms, Structure of C Program.	[6]
Unit 2: Types, Operators and Expressions Variable names, Data types, sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation	[6]
Unit 3: Decision Making and Looping Statements Statements and Blocks. If-else, else-if switch Loops while and for, do-while break and continue go to and Labels.	[6]
Unit 4: Arrays Initializing arrays, Initializing character arrays ,two dimensional and multidimensional arrays.	[6]
Text Books 1. C Programming Absolute Beginner's Guide, Que Publishing; 3rd edition (22 August 2013) 2. C Programming Language 2nd Edition, Peasrson Publication	
Reference Books 1. C: The Complete Reference, McGraw Hill Education; 4th edition (1 July 2017) 2. C Programming in easy steps, 5th Edition, In Easy Steps Limited 3. The C Programming Language, Second Edition, By Pearson Education India (1 January 2015)	

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PRJ02	PROJ	Mini Project - II	0-0-2	Audit

Teaching Scheme:	Examination Scheme:
Practical: 2 hrs/week	Continuous Assessment 1: 25 Marks Continuous Assessment 2: 25 Marks

Course Outcomes: Upon successful completion of this course, the students will be able to:	
CO1	Identify the problems related to technical, social importance.
CO2	Convert open-ended problem statements into the statement of work
CO3	Identify the literature gap with the help of available literature and survey
CO4	Inculcate problem-solving skills and critically analyze the options available to solve the problem.
CO5	Conceive the importance of documentation and report writing

About Mini Project - II

An engineering graduate must pay attention to societal concerns to alleviate some of the real-life societal challenges by delivering reasonable technology solutions. The Mini Project - II concept is based on the same theme. The Mini Project - II to attempts to discover societal problems and develop answers utilizing science and technology for the betterment of society or human life. This will assist students in understanding the product/project development process, best practices and encouraging their creativity to tackle real-world problems. While developing the application/product, students will learn effective team building, designing, budgeting, planning, engineering skills and processes, and safety norms and standards. Students will recognize the need for documentation and professional ethics.

Guidelines

1. Every student shall undertake the Mini Project in semester III and continue for semester IV.
2. A group of a minimum of 3 and a maximum of 5 students shall be allotted for each minor project.
3. The students have to identify the problem by a discussion with various stakeholders, site visits, expert opinions and various research articles in consultation with the project guide.
4. Collect sufficient data and survey to establish the criticality of the problem to be solved.
5. Apply various tools for project planning and design.
6. Critically analyze various solutions/techniques to solve real-world problems.
7. Select and justify one of the solutions identified based on the feasibility, affordability, ease of use and environmental concern.
8. Learn and apply standards of engineering ethics and professional behavior

The committee of senior faculty members and a guide will be appointed to monitor the progress and continuous evaluation of each project. The assessment shall be done jointly by the guide and committee members.

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Department: Department of Civil Engineering   **Rev:** Course Structure/00/2021-22
Class: S.Y. B. Tech   **Semester:** IV

Course Code	Type of Course	Course	Teaching Scheme				Evaluation Scheme					Credits
			L	T	P	Total Hrs.	CA1	CA2	MSE	ESE	Total	
CE401	PCC	Surveying –II	3	-	-	3	10	10	30	50	100	3
CE402	ESC	Hydraulics –II	3	-	-	3	10	10	30	50	100	3
CE403	PCC	Structural Analysis-I	4	-	-	4	10	10	30	50	100	4
CE404	PCC	Concrete Technology	2	-	-	2	10	10	30	50	100	2
CE405	PEC	Elective-I	2	-	-	2	10	10	30	50	100	2
CE406	PCC	Surveying –II Laboratory	-	-	2	2	15	15	-	20	50	1
CE407	ESC	Hydraulics –II Laboratory	-	-	2	2	25	25	-	-	50	1
CE408	PCC	Concrete Technology Laboratory	-	-	2	2	15	15	-	20	50	1
CE409	ESC	Computer Aided Drawing Laboratory	-	-	2	2	25	25	-	-	50	1
MDC02	MC	Environmental Sciences	2	-	-	2	25	25	-	-	50	Audit
HMS03	HSMC	Aptitude Skills-II	1	-	-	1	25	25	-	-	50	Audit
HMS04	HSMC	Language Skills-II	-	-	2	2	25	25	-	-	50	1
PRJ03	PROJ	Mini Project - III	-	-	2	2	25	25	-	-	50	1
IFT01	PROJ	Industrial Training/ Field Training - I	-	-	-	-	-	-	-	50	50	Audit
		TOTAL	17	-	12	29	230	230	150	340	950	20

* Elective-I List

CE 405 A	Application of Numerical Methods
CE 405 B	Sustainable Development
CE 405 C	Construction Equipment's
CE 405 D	Advanced materials & techniques

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Surveying-II

CE401	PCC	Surveying-II	3-0-0	3 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs./week	Continuous Assessment 1 : 10 Marks
	Continuous Assessment 2 : 10 Marks
	Mid Semester Exam : 30 Marks
	End Semester Exam : 50 Marks

Pre-Requisites: Surveying-I

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

CO1	Understand the basic knowledge in tacheometric surveying in calculating distance and RL for the given terrain and prepare its plan using field measurements.
CO2	Identify and apply the fundamental knowledge in triangulation surveying for the horizontal control.
CO3	Identify the basic knowledge in hydrographic and tunnel surveying
CO4	Applying basic knowledge in setting the curve by linear and angular method by IRC code
CO5	Identify the procedural part of photogrammetric surveying
CO6	Outline remote sensing, GIS and GPS as modern methods of surveying

Course Content

Unit 01 : Tacheometric Surveying Significance of tacheometry , systems, Principle, constant determination, basic formula, analytic lens, distance and elevation by stadia method and tangential method; numerical problems on both methods. Introduction to total station and use	[6]
Unit 02: Triangulation: Principle and Classification ,system of triangulation, selection of points ,Use of sub- tense bar for base line measurement ,Signals and satellite station , Concept of reduction to center ,spherical access ,concept of tri-laateration	[6]
Unit 03: Hydrographic and Tunnel surveying Terms, hydrographic surveying –sounding equipment, methods –preliminary survey –Tunnel alignment, transfer of ground points, surveying suitability and alignment.	[5]
Unit 04: Curves Introduction, types of curve, relation between degree of curve and radius Horizontal curves: setting of curve by linear and angular method, problems on curve setting, Transition curve –Types, criteria for finding length, problems on transition curve, Vertical curve – design of curve by tangent correction method.	[7]
Unit 05: Photogrammetry Terms used in photogrammetry and photographs, flight planning, concept of mosaic, concept of stereoscopic fusion, stereoscopic fusion	[6]
Unit 06: Modern methods of surveying Remote sensing – definition, relevance, types electromagnetic radiation and spectrum and application in Civil Engineering ; GPS –Principle, segment, overview of application ; GIS – Terminology, basic component, overview of applications	[6]

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Text Books:

1. Kanetkar T.P. and Kulkarni S.V. "Surveying and Levelling – Part1", Pune Vidyarthi Griha Prakashan, Pune.
2. Kanetkar T.P. and Kulkarni S.V. "Surveying and Levelling – Part2", Pune Vidyarthi Griha Prakashan, Pune.

Reference Books

1. Duggal S. K. "Surveying Volume I", Tata McGraw-Hill Publishing Company Limited.
2. Duggal S. K. "Surveying Volume II", Tata McGraw-Hill Publishing Company Limited.
3. Bannister A, Raymond S & Baker R. "Surveying", Pearson Education Ltd.
4. Subramanium R., "Surveying & Levelling", Oxford University Press. 52
5. Clark David, "Plane and Geodetic Surveying for Engineers Volume–I", CBS, 6/E.
6. Clark David, " Plane and Geodetic Surveying for Engineers Volume –II", CBS, 6/E
7. Punmia B. C., Jain A, Jain A., "Surveying-II", Laxmi Publications (P) Ltd. New Delhi.
8. IRC:38:1988, Guidelines for design of horizontal curves for highways and design table
9. IS:11134-1984, Code of practice for setting out of buildings

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Hydraulics - II

CE402	ESC	Hydraulics - II	3-0-0	3 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 3hrs/week	Continuous Assessment 1 : 10 Marks Continuous Assessment 2 : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

Pre-Requisites: Hydraulics I

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

CO1	Compare open channel flow with pipe flow and list geometric elements in open channel and Define specific energy.
CO2	Summarize channel slopes and gradually varied flow profiles
CO3	Explain the characteristics of hydraulic jump and concept of Spatially varied flow
CO4	Classify the Notch and weir
CO5	Make use of momentum principle of impact of jets on plane
CO6	Explain the performance characteristics of hydraulic turbines and pumps

Course Contents

Unit 1: Flow in open channel Introduction, types of flow in channel, Geometric properties of rectangular, triangular, trapezoidal and circular channel, Chezy's equation, Manning's equation problem. Most economical channel sections Most economical open channels - rectangular, triangular, trapezoidal and circular channel problems. Depth Energy relationship in Open channel flow – Specific Energy (Definition and diagram, Critical, Sub-critical, Super critical flow, Specific force (Definition and Diagram)	[7]
Unit 2: Gradual Varied Flow (G.V.F) Definition, Classification of channel slopes, Dynamic equation of GVF (Assumption and derivations), Classification of GVF profiles- Practical, Examples, Direct step method of completion of GVF profiles	[5]
Unit 3: a) R.V.F -Definition ,Hydraulic Jump –Phenomenon ,Conjugate depth relationship characteristic ,Uses and Type of hydraulic Jump ,Hydraulic Jump as an Energy Dissipater b) b) S.V.F (Spatially varied flow)- Basic principle and assumption, Dynamic equation and Analysis of flow profile, Isoclinal method spatially varied steady and unsteady surface flow.	[6]
Unit 4: Notches and Weir Types and weir ,Types ,Derivation of discharge equation, Velocity of approach, Francis Formula, Calibration of notches ,Error in measurement of discharge ,sharp ,Board and round crested weir, calibration of weir ,Time of emptying tank with weir	[6]
Unit 5: Impact of Jet Momentum principle, Impact of Jet vanes flat, curved (stationary and moving) Inlet and outlet	[5]

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velocity Triangles, Series of flat, curved vanes   mounted on wheel.

Unit 6:	[7]
a) Hydraulic Turbines- Importance of Hydro-power ,classification of turbines –Pelton, Francis and Kaplan Turbine , Unit quantities, specific speed, Performance , Characteristic, selection of Types of turbine, Concept of Draft Tube . b) Centrifugal Pump- Classification, Concept parts ,working of centrifugal pump, Performances characteristics, Common Pump Troubles and Remedies, Net positive Suction Head (NPSH)	

Text Books
1. Modi, Seth, "Fluid Mechanics – Hydraulic & Hydraulic Mechanics" Standard Book House
2. Bansal R.K., "Fluid Mechanics", Laxmi Publications, 9th edition 2017
3. Garde R. J., "Fluid Mechanics through Problems", New Age Publications, 3rd edition 2011
4. Jain A. K., "Fluid Mechanics", Khanna Publications, 8th edition, 2003, Delhi
5. Kumar K. L., "Fluid Mechanics", Eurasia Publication House, 11th edition, Delhi
6. Rangaraju, "Open Channel flow", Tata McGraw-Hill Pub. Co., Delhi
7. Subramanian K., "Fluid Mechanics through Problems" Tata McGraw-Hill Pub. Co., Delhi
8. Subramanian K., "Flow in Open Channel", Edition V, Tata McGraw-Hill Pub. Co., Delhi

Reference Books
1. Streeter, "Fluid Mechanics" McGraw-Hill International Book Co., 3rd edition, Auckland
2. Shames, "Mechanics of Fluids", McGraw Hill, 4th edition
3. Chaw V. T., "Flow in Open Channel", McGraw-Hill International Book Co., Auckland
4. Hughes & Brighton, "Fluid Mechanics", Tata McGraw Hill

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Structural Analysis-I

CE403	PCC	Structural Analysis-I	4-0-0	4 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 4 hrs/week	Continuous Assessment:10 Marks Continuous Assessment: 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

Pre-Requisites: Engineering Mechanics, Strength of materials
Course Outcomes: At the end of the course, students will be able to:

CO1	Analyze the long column by Euler's and Rankine's theory.
CO2	Analyze the slope and deflection for determinate beam.
CO3	Illustrate the concept of energy principle.
CO4	Analyze the principle stresses and strains in two dimensions by analytical and graphical Method.
CO5	Illustrate the different theories of failure.
CO6	Model the influence line diagram for compound beam and trusses.

Course Contents

Unit 1: Column Concept of critical load and bulking, Euler's theory, Limitations of Euler's formula, Equivalent length for various end conditions, Rankin's theory.	[7]
Unit 2: Slope And Deflection Of Beam Slope and deflection of determinate beam, double integration method, Maculay's method, Moment area method, Conjugate beam method.	[9]
Unit 3: Energy Principles Concept of strain energy due to axial force, shear force, bending moment and torsional moment, Castigliano's first theorem, Unit load method, Maxwell's theorem of reciprocal displacements and Betti's law.	[10]
Unit 4: Principal Planes And Stresses Principal planes and stresses in two dimensions, concept of principal planes and stresses by analytical and graphical method- Mohr's circle method, combined effect of bending, torsion, axial and shear force.	[8]
Unit 5: Theory Of Failure Maximum Principle stress criterion (Rankine, Lame's), Maximum Principle strain Theory (St.Venant's), Maximum Strain Energy Theory (Beltrami-Haigh's), Maximum Shear Stress Theory (Tresca-Guest and Coulomb).	[6]
Unit 6: Influence Line Diagram Concept of Muller-Braslau's principle, Influence line diagram for determinate beams, compound beams, Influence line diagram for axial force and trusses.	[9]

Text books:
1. Junnarkar S.B. (2014), "Mechanics of Structures", Charotor Publishers, Anand, 31st edition,

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2. Khurmi R.S., "Strength of Material", S. Chand and Co., Edition revised 1968, New Delhi
3. Ramamrutham S., "Strength of Materials", Dhanpatrai and Sons, Delhi
4. Punmia B. C., "Mechanics of Materials" Laxmi Publications, revised edition, 2016
5. Bhavikatti S.S, "Strength of Materials" New Age Publications.
6. R.K.Bansal, "Strength of Materials" Laxmi Publications.

Reference books:
1. Subramanian R., "Strength of Materials" Oxford University Press, 2nd edition, New Delhi
2. Gere and Timoshenko, "Mechanics of Materials" CBS publishers.
3. R.C. Hibbler, "Mechanics of Materials" Pearson Education.
4. J.B. Popov, "Introduction to Mechanics of Solids" Prentice – Hall publication.

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Concrete Technology

CE404	PCC		Concrete Technology	2-0-0	2 Credits

Teaching Scheme:		Examination Scheme:
Lecture: 2 hrs/week		Continuous Assessment-I :10 Marks Continuous Assessment-II :10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

Pre-Requisites: Building Material, Construction & Maintenance

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

CO1	Explain the functional role of ingredients of concrete.
CO2	Apply the knowledge of fresh concrete
CO3	Evaluate properties of harden concrete.
CO4	Develop an awareness of durability of concrete.
CO5	Design concrete mix for various grades of concrete.
CO6	Apply fundamental knowledge of admixture and special of concrete

Course Contents

Unit 1: Concrete Ingredients **Cement:** Main constituents of cements, Hydration process of cement, Physical properties and testing of cement. Effect of fineness, Initial & final setting time of cement, Various tests on cement: Soundness test, Hardening and compressive strength of cement, grades of cement, different types of cement. **Aggregates:** Aggregate characteristics and their significance in strength, workability, placement and compaction of concrete. Specific gravity, bulk density, porosity, absorption of aggregate, moisture content of aggregate, bulking of sand abrasion test, impact value. Alkali aggregate reaction, Artificial and Recycled aggregate.	[05]
Unit 2: Properties of Fresh Concrete **Concrete preparation process** – Batching, Mechanical mixers, automatic batching and mixing plants. Efficiency of mixing and transportation, placing, methods of compaction, curing, RMC plant. **Properties for fresh concrete** - Factors influence workability, workability test on fresh concrete by slump cone, compaction factor and vee bee consistometer test. Segregation and bleeding.	[03]
Unit 3: Properties for hardened concrete Strength test on harden concrete like compressive strength test, flexure test and split tension test. Factors affecting strength – water cement ratio, gel space ratio, aggregate cement ratio, properties of ingredients, effect of age, maturity, aggregate cement-paste inter-face, various finishes of concrete. Introduction to aspects of elasticity, shrinkage and creep. Non Destructive Testing Rebound hammer, Ultra Sonic Pulse Velocity, Impact echo test	[04]
Unit 4: Durability and Permeability of Concrete Volume change of concrete, freezing and thawing, chemical actions- sulphates attack, carbonation, chloride attack and its determination. Alkali – aggregate reaction, sulphate attack, chloride and acid attack. Effect of sea water, special coating for water proofing, concrete for hot liquids. Test on	[04]

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concrete permeability. Concrete in extreme hot and cold condition, under water construction. Concrete in road pavements, concrete dams. Green concrete- ingredients, manufacturing process, applications and durability aspects.

Unit 5: Concrete Mix Design Mix Design- Process, statistical relation between main and characteristic strength, variance, standard deviation, Factors affecting mix properties, Methods of Mix Design IS(10262), and DOE, High strength concrete, Acceptance criteria for concrete as per IS specifications	[03]
Unit 6: Admixtures and Special Concrete **Admixtures:** Types of admixtures- air entraining, water reducing, accelerators, retarders, plasticizers and super plasticizer, grouting agents, surface hardeners. **Additions to Concrete:** Types, covering pulverised fuel ash, ground granulated blast furnace slag and silica fume. IS 9103(1999). Applications; mixer blends and blended cements. **Special Concrete:** Ingredients, mix proportioning, mechanical properties, applications of following concrete- High strength concrete, high performance concrete, no-fines concrete, fiber reinforced concrete, Ferro cement, self-compacting concrete, light weight concrete, mass concrete, polymer concrete, and precast concrete etc.	[05]

Text Books
1. Gambhir M. L. " Concrete Technology" , Tata Mc-Graw Hill 2015 15th edition
2. Shetty M. S. "Concrete Technology", S. Chand 2005.
3. Krishnaswamy, " Concrete Technology" , Dhanapat Rai and Sons

Reference Books
1. Orchard, " Concrete Technology" , Applied Science Publishers
2. Neville A. M., "Concrete Technology" , Pearson Education
3. Neville A. M., " Properties of Concrete" , Pearson Education
4. IS:10262(2009), IS:456 (2009) by Bureau of Indian Standards, New Delhi

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A)Applied Numerical Methods

CE405A	PEC	A)Applied Numerical Methods	2-0-0	2 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs/week	Continuous Assessment-I : 10 Marks Continuous Assessment-II : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

Pre-Requisites: Engineering Mathematics-I & II

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

CO1	Solve the system of simultaneous linear equations by direct & iterative methods.
CO2	Solve the algebraic and transcendental equations by numerical techniques and explain the concept of error and solve the problems related to errors.
CO3	Apply various interpolation methods and finite difference concepts.
CO4	Apply numerical integration techniques whenever and wherever routine methods are not applicable.
CO5	Apply different methods to find the correlation between the variable.
CO6	Solve the problems related to Testing Hypothesis.

Course Contents

Unit 1: Solution of Simultaneous linear Equations Gauss elimination method, Gauss-Jordan method, Iterative method of solution- Jacobi iteration method, Gauss-Seidal iteration method, Relaxation method, Determination of Eigen values by iteration.	[6]
Unit 2: Numerical solution of transcendental & algebraic equations and Errors Solution of Algebraic and Transcendental Equation: Bisection method, Method of false position, Newton's method and Newton-Raphson method. **Errors:** Introduction, Types of errors; Rules for estimate errors; Error propagation; Error in the approximation of function.	[8]
Unit 3: Interpolation Finite differences: Interpolation/extrapolation using Newton's forward and backward difference formulae, Newton's divided difference and Lagrange's formulae (All formulae without proof). Application in Deflection of Determinate Beams, Buckling Load of Long Columns.	[6]
Unit 4: Numerical Integration Trapezoidal rule, Simpson's $(1/3)^{rd}$ rule, Simpson's $(3/8)^{th}$ rule and Weddle's rule (without proof).Problems.	[4]
Unit 5: Correlation Introduction, Types of correlation, Correlation and causation, Methods of studying correlation, Karl Pearson's correlation coefficient, Spearman's rank correlation, Coefficient, Properties of Karl Pearson's correlation coefficient and Spearman's rank correlation coefficient, Probable errors.	[3]
Unit 6: Applied Statistics	[3]

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Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Text books:

1. P. N. Wartikar & J. N. Wartikar, A Text Book of Applied Mathematics (Vol I & II), Pune.Vidyarthi Griha Prakashan, Pune.
2. N. P. Bali, A Text Book of Engineering Mathematics, Laxmi Publications, New Delhi.
3. Peter O" Neil, A Text Book of Engineering Mathematics, Thomson Asia Pvt. Ltd., Singapore.
4. E.Balagurusamy, "Numerical Methods", TataMcGraw Hill Publications,1999.
5. G. V. Kumbhojkar, Probability and Random Processes, C. Jamnadas and Co., 14th Edition, 2010.

Reference books:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
3. B. V. Ramana, Higher Engineering Mathematics, McGraw-Hill Publications, New Delhi.
4. C. R. Wylie & L. C. Barrett, Advanced Engineering Mathematics, McGraw Hill Publishing Company Ltd.
5. S. S. Sastry, "Introductory Methods of Numerical Analysis", PHI, 1990, 3rd edition.
6. K. E. Atkinson, "An Introduction to Numerical Analysis",Wiley,1978
7. M.J. Maron, "Numerical Analysis: A Practical Approach", Macmillan, New York, 1982
8. Vijay K. Rohatgi, A. K. Md. Ehsanes Saleh, An Introduction To Probability and Statistics, Wiley Publication, 2nd Edition, 2001.
9. S. C. Gupta, Fundamentals of Statistics, Himalaya Publishing House, 7th Revied and Enlarged Edition, 2016.

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B)Sustainable Development

CE405B	PEC	B)Sustainable Development	2-0-0	2 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs/week	Continuous Assessment-I : 10 Marks Continuous Assessment-II : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

Pre-Requisites: NA

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

CO1	Explain significance of sustainable development in current world.
CO2	Summarize Strategies for promoting sustainable development and the reasons of resistance to it.
CO3	Explain the importance of need for innovations to boost sustainable development
CO4	Recognize the need of social transformation and ways to achieve it.
CO5	Recognize the need of good governance and the aspects of it.
CO6	Explain various ways to develop the capacity and various research methods.

Course Contents

Unit 1: Introduction to SD Definition, scope and importance, multidisciplinary nature of course. Need for public awareness, Pillars of sustainable development like society, environment and finance, Discussion on 17 goals of SD, set by UNO and targets to achieve by Nitee aayog, India	[6]
Unit 2: Strategies to promote SD Strategies for promoting sustainable development, resistances to the concept, Some alternative approaches. Examine some important current issues. Debate on few areas of SD	[5]
Unit 3: Innovations for SD Environmental degradation Meaning of innovation, Importance and few thrust areas like waste management, pollution etc., IPR/ patenting for innovation	[4]
Unit 4: Societal transformation Need of social transformation, Types of societal transformation, various types of institutional theory	[4]
Unit 5: Governance for SD and policy responses Difference between government and Governance, Importance of good governance, Policies in India as environmental legislation.	[4]
Unit 6: Capacity Development and research methods Meaning, scope of capacity development, current limitations, Various means of capacity development, Classification of research methods, their applications and significance, Research methodology / techniques, Data Collection, Social Survey, interpreting of data and Survey ,Statistical approach for the analysis.	[5]
Recommended Textbooks/ resources: 1. Harris, J.M. (2204) Basic Principles for Sustainable Development, Global Development and Environment Institute, working paper 00-04, available at: http://ase.tufts.edu/gdae/publications/Working_Papers/Sustainable%20Development.PDF	

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2. Robinson, J. (2004), "Squaring the circle? Some thoughts on idea of sustainable Development" Ecological Economics 48(4): 369-384.
3. Hjorth, P. & A. Bagheri (2006), "Navigating towards Sustainable Development: A System Dynamics Approach", Futures 38: 74-92.
4. Mog, J.M. (2004) „Struggling with Sustainability – A Comparative Framework for Evaluating Sustainable Development
5. Programs_, World Development 32(12): 2139–2160. IISD Commentary on the OECD's Draft Principles for International
6. Investor Participation in Infrastructure (PDF – 68 kb)
7. Arundel, A., R. Kemp, and S. Parto (2004) Indicators for Environmental Innovation: What and How to Measure, forthcoming in International Handbook on Environment and Technology Management (ETM), edited by D. Annandale, J.Phillimore and D. Marinova, Cheltenham, Edward Elgar.

C)Construction Equipment's

CE405C	PEC	C)Construction Equipment's	2-0-0	2 Credits

Teaching Scheme:	**Examination Scheme:**
Lecture: 2 hrs/week	Continuous Assessment-I : 10 Marks Continuous Assessment-II : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

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

CO1	Explain various equipment used in construction industry along with their function.
CO2	Select equipment base on economic analysis.
CO3	Justify equipment selection for particular activity.
CO4	Select proper mechanized resource for improving output of work at construction project

Course Contents

Unit 1: Introduction Brief introduction to various types of equipment's required for construction, Necessity of using equipment's. Advantages of mechanized construction over conventional methods.	[5]
Unit 2: Fundamentals Concept of equipment economics Equipment Records Cost of Capital, Evaluating Investment Alternatives, Elements of Ownership Cost, Elements of Operating Cost, Replacement Decisions.	[5]
Unit 3: Earthwork Equipment Earthwork Equipment's: Fundamental, Types of Earth Work Equipment such as Front shovel and backhoe, e.g Tractors, dragline, clamshell, bulldozers, loaders, Motor Graders, Scrapers	[5]
Unit 4: Compaction and Hauling Equipment Use of, compacting equipment's for different types of construction work Study of different types of rollers, e.g Tandem roller, Pneumatic roller, Sheep foot roller, vibratory roller etc compacting plate load vibrators, different types of dumpers, Use of bowser, paver in construction, RMC transit trucks, conveyors.	[5]
Unit 5: Concreting Equipment Introduction, Concrete Mixtures: Concrete Mixing Techniques, Ready-Mixed Concrete, Placing Concrete: Manual or Motor-Propelled Buggies, Chutes and Drop Pipes, Belt Conveyors, Concrete Pumps, Consolidating and Finishing: Consolidating Concrete, Finishing and Curing Concrete.	[5]
Unit 6: Cranes Cranes: Types of cranes, Mobil cranes: Crawler cranes, telescoping-boom truck mounted cranes, lattice-boom truck-mounted cranes, rough-terrain cranes, all terrain cranes tower cranes: classification, operation, tower crane selection.	[5]

Reference books

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1. Concrete Technology: M.S Shetty
2. Construction Equipment and Its Management – S.C Sharma
3. Construction Equipment management for Engineers, Estimators and owners- Douglas D. Gransberg
4. Construction Planning, Equipment and Method- Purifoy

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D)Advanced Materials & Techniques

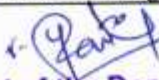| CE405D	PEC	D)Advanced Materials & Techniques	2-0-0	2 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs/week	Continuous Assessment-I : 10 Marks Continuous Assessment-II : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

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

CO1	Develop skill among students to construct strong and durable structures by applying knowledge of material science.
CO2	Make the students aware of quality assurance and control in their real life as a professional.
CO3	Select materials base on properties and Justify materials selection for particular structure/work/activity.
CO4	Summarize the properties of different material and various tests on cement.

Course Contents

Unit 1:Civil Engineering Materials a) Structural materials: Overview of advance construction materials and criteria for selection; Metals, Engineered wood products, glass for glazing, glass fibres, glass wool, calcium silicate bricks, concrete blocks, rubbles, different applications, floor and roofing tiles, slates, timber, strength of timber. b) Non-Structural materials: waterproofing materials, bituminous materials, binder properties, binder mixtures, asphalt mixture, Tiles, Paints, Polymer floor Finishes, Fittings, Anchors, Other materials	[6]
Unit 2: Basic Properties of Materials Importance of Advance materials in civil engineering construction, types of materials such as ceramics composites, optical /electronics materials, nano-materials ,polymers and plastics and other materials some basic properties of materials such as temperature, energy, specific heat, thermal conductivity coefficient of thermal expansion ,mechanical properties of materials, Variability of material properties.	[5]
Unit 3: Composite Materials RCC, FRC, steel/concrete composite bridge decks, fibre reinforced plastics structural insulated panels.	[4]
Unit 4: Comparison of Different Materials Introduction, comparison of strengths of various materials, comparison for environmental impact, health and safety	[4]
Unit 5: Advance Techniques in Construction Introduction,3D printing, photo catalytic admixture, self-healing concrete, zero cement concrete ,hemp lime, wood-glass epoxy composites, bamboo.	[4]
Unit 6: Material Testing ,Machines And Equipment Requirements	[7]

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Necessity of material testing, various testing methods, destructive tests, classification of destructive tests static, impact and cyclic testing, non-destructive testing its classification ,visual inspection, penetration test, magnetic detection, ultrasonic test, radiography test and spark test. Types of testing machines, UTM and CTM, force and displacement controlled machines, loading frames. Hardness testing machines, fracture tests

Reference books

1. S.V. Deodhar., Civil Engineering Materials', Allied Publishers, N. Delhi.
2. S.C Rangwala., Civil Engineering Materials', Dhanpat Rai and Sons, N. Delhi.
3. Concrete Technology: M.S Shetty
4. Chudley R., "Construction Technology", Vol.1, 2, 3 and 4 ELBS Publisher
5. SP 7- National Building Code Group 1 to 5, B.I.S. New Delhi
6. Catalogues. Information Brochures, Trade Literature by material or product manufacturers

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Surveying-II Laboratory

CE406	PCC	Surveying-II Laboratory	0-0-2	1 Credit

Teaching Scheme:	Examination Scheme:
Practical: 2 hr/week	Continuous Assessment 1 : 15 Marks Continuous Assessment 2 : 15 Marks End Semester Exam : 20 Marks

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

CO1	Experiment for determination of distance and elevation of point using the tacheometry.
CO2	Apply the basic knowledge of curve for setting the curve as per the method used
CO3	Demonstrate the surveying instrument for RL determination ,and interpolation of contours to prepare the contour map
CO4	Draw plan and sectional view of road from recorded field measurement and estimate the quantity from field measurement.
CO5	Prepare the report on given toposheet and explain the feature

List of Experiments

1. Experiment on determination of tachometric constants
2. Experiment on finding the gradient of line
3. Experimental planning to find the area of polygon
4. Experiment on total station traversing
5. Experiment on Curve setting by linear method
6. Experiment on Curve setting by angular method
7. Experiment on Setting of transition curve
8. Experiment on length calculation from GPS co-ordinates
9. Report on Topo sheet
10.Demonstration of software in surveying

Projects
1. Road Project: 300 m -600 m
2. Radial Contouring

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Hydraulics - II Laboratory

CE407	ESC	Hydraulics - II Laboratory	0-0-2	1 Credit

Teaching Scheme:	Examination Scheme:
Practical: 2 hr/week	Continuous Assessment 1 : 25 Marks
	Continuous Assessment 2 : 25 Marks

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

CO1	Understand various properties of fluids and measurement techniques.
CO2	Experiment with calibrations of various flow measuring devices
CO3	Demonstrate mechanism of hydraulic jump, various jets and pumps.

Term Work:

Practical Work consists of at least three performances from groups listed below and detailed reporting in form of journal.

Group (A)

1) Calibration of V notch / Rectangular notch
2) Calibration of Ogee Weir.

3) Study of hydraulic jump
   a) Verification of sequent depths,
   b) Determination of loss in jump.
   c) Study of parameters with respect to Fraud Number: i) Y2/Y1; ii) Length; iii) Energy loss.

4) Study of flow below gates – Discharge v/s head relation, Equation of flow, Determination of contraction in fluid in downstream of gate.
5) Velocity distribution in open channel in transverse direction of flow.

Group (B)

1) Impact of jet.
2) Study of Turbines (Demonstration).
3) Tests on Centrifugal Pump.
4) Study of Charts for Selection of Pumps   Use of computer programs such as MS Excel is desirable for post-processing of results.

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Concrete Technology Laboratory

CE408	PCC	Concrete Technology Laboratory	0-0-2	1 Credit

Teaching Scheme:	Examination Scheme:
Practical: 2 hrs/week	Continuous Assessment 1 : 15 Marks Continuous Assessment 2 : 15 Marks End Semester Exam : 20 Marks

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

CO1	Determine the quality of ingredients of concrete as per IS codes.
CO2	Design a concrete mix as per the requirement at the field using various codes.
CO3	Asses the suitability of NDT methods on field.

List of Experiments:

At least minimum 8 experiments should be performed from the Section I whereas Section II is compulsory.

Section 1: Test in Lab

1) Testing of Cement: Consistency, Fineness, Setting Time
2) Soundness and Compressive strength for Cement
3) Testing of aggregate: Sp. Gravity, porosity, bulk density and void ratio of CA and FA
4) Testing of aggregate: Sieve analysis of FA and CA, Flakiness Index of CA. Aggregate Impact   value and Aggregate crushing value
5) Placement Tests on Concrete: Workability Tests: Slump, Compaction,
6) Strength Tests on Concrete: Compression, Flexure, Split & Tensile Test,
7) Effects of Admixture: Accelerator, Retarder, Super Plasticizer,
8) Exercise and verification of Concrete Mix Design as per IS 10262- 2007 and IS 456-2000,
9) Non-destructive Testing for Concrete: Rebound Hammer test, Ultrasonic Pulse Velocity test

Section 2: Site Visit

1) NDT Project (using rebound hammer and ultrasonic pulse velocity tests) on any site with a short report.
2) Site visit to study advances in Concrete Technology (like RMC, Pumped concrete etc.) with a short report.

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Computer Aided Drawing Laboratory

CE409	ESC	Computer Aided Drawing Laboratory	0-0-2	1 Credit

Teaching Scheme:	Examination Scheme:
Practical :2 hrs/week	Continuous Assessment 1 : 25 Marks Continuous Assessment 2 : 25 Marks

Pre-Requisites: Building Construction, Building planning and design
Course Outcomes: At the end of the course, students will be able to

CO1	Prepare detailed engineering drawings
CO2	Know details about various components of building in detail
CO3	Use advanced drafting software for 2D and 3D

Course Contents

1. Various components of building.
2. Various Commands Used for 2D drafting in AutoCAD
3. Project on Residential Building
4. Project on Public Building
5. Details of Municipal Drawing
6. Introduction to 3D drawing

Reference books
1. David Frey (BPBS ybex Publications)
2. Auto CAD – George Omura
3. Auto CAD 2019 training guide AutoCAD

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Environmental Sciences

MDC02	MC	Environmental Sciences	2-0-0	Audit

Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs/week	Continuous Assessment 1: 25 Marks
	Continuous Assessment 2: 25 Marks

Pre-Requisites: NA

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

CO1	Explain various natural resources and associated Problems
CO2	Summarize various ecosystems
CO3	Explain the importance of conservation of biodiversity and its importance in balancing the earth.
CO4	Recognize various causes of environmental pollution along with various protection acts in India to limit the pollution
CO5	Interpret the information based on field study and prepare a report.

Course Contents

Unit 1: Nature of Environmental Studies	[2]
Definition, scope and importance, Multidisciplinary nature of environmental studies. Need for public awareness.	

Unit 2: Natural Resources and Associated Problems	[6]
Forest resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people. **Water resources**: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems. **Mineral resources**: Usage and exploitation. Environmental effects of extracting and using mineral resources. **Energy resources**: Growing energy needs, renewable and nonrenewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy. **Land resources**: Solar energy, Biomass energy, Nuclear energy, Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of individuals in conservation of natural resources.	

Unit 3: Ecosystems	[4]
Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession. Food chain etc. in concern with forest ecosystem, Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chain etc. in concern with Grassland ecosystem Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chain etc. in concern with Desert ecosystem Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chain etc. in concern with various aquatic ecosystems	

Unit 4: Biodiversity	[4]

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Introduction- Definition: genetic, species and ecosystem diversity, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, various approaches for the conservation of biodiversity. And at least one case study in line with this	
Unit 5: Environmental Pollution and Environmental Protection Definition: Causes, effects and control measures of various types of pollution. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution, Concept of sustainable development : From Unsustainable to Sustainable development Various environmental Protection Acts and their scope	[4]
Unit 6: Field Work The student should Visit to a local area to document environmental assets- River/Forest/Grassland/Hill/Mountain. Or Visit to a local polluted site - Urban / Rural / Industrial /Agricultural. Study of common plants, insects, birds. or Study of simple ecosystems - ponds, river, hill slopes, etc. The student should expect to do this activity in a group size of 4-5 and prepare and submit a report on it.	[4]

Text Books & References :

1. Agarwal, K.C.2001, Environmental Biology, Nidi Pub. Ltd., Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013, India.
3. Clank R.S. Marine Pollution, Clanderson Press Oxford (TB)
4. De A.K., Environmental Chemistry, Wiley Wastern Ltd.
5. Down to Earth , Centre for Science and Environment , New Delhi.(R)
6. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
7. Miller T.G. Jr., Environmental Science. Wadsworth Publications Co.(TB).
8. Rao M.N.and Datta, A.K.1987, Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd.,
9. Sharma B.K., 2001, Environmental Chemistry, Gokel Publ. Hkouse, Meerut
10. Survey of the Environment, The Hindu (M)
11. Townsend C., Harper, J. and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
12. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, vol. I and II, Environmental Media (R)

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Aptitude Skills- II

HMS03	HSMC	Aptitude Skills- II	1-0-0	Audit

Teaching Scheme:	Examination Scheme:
Lecture: 1 hrs/week	Continuous Assessment 1:25 marks
	Continuous Assessment 2:25 marks

Group A (CSE, E&TC, AI&DS, Electrical)

Verbal Ability (12Hrs) (Compulsory)

Pre-Requisites: Communication Skills, Aptitude Skills- I
Course Outcomes: At the end of the course, students will be able to:

CO1	Understand basic concepts of sentences and its structure
CO2	Understand the tenses and its use in daily life
CO3	Explain basic uses of speeches and voices in day to day life
CO4	Understand the use of modal verbs in sentence construction
CO5	Summarize various Phrases, Idioms and Proverbs
CO6	Summarize different words used in daily life

Course Contents

Unit 1: English Grammar Structure and Types of Sentence, Conditional Sentences	[2]
Unit 2: Tenses Present tense, Past tense, Future tense, Use of Tenses in Sentence forming	[2]
Unit 3: Speeches and Voices Direct and Indirect Speech, Active and Passive Voice	[2]
Unit 4: Modal Use of Modal verbs in Sentence Forming, Substitution and Elimination	[2]
Unit 5: Proverbs, Idioms and Phrases Use of Proverbs, Idioms and Phrases in Sentence Construction, Judgment and Inference Sentence	[2]
Unit 6: Vocabulary Vocabulary Building in Various Situations	[2]

Text Books:
1. Raymond Murphy, Essential English Grammar with Answers, Murphy
2. Objective General English by R.S. Aggarwal, S Chand Publishing; Revised edition (15 March 2017)

Reference Books:
3. Rao N,D,V,Prasada, Wren & Martin High School English Grammar and Composition Book, S

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Chand Publishing, 2017
4. Murphy, Intermediate English Grammar with Answers, Cambridge University Press; Second edition

Group E (Civil, Mech., Mechatronics)

Aptitude (12Hrs) (Compulsory)

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

CO1	Understand speed math techniques to solve aptitude problems
CO2	Summarize number systems in detail.
CO3	Explain basic aptitude techniques related to Percentage, Average, Ratio Proportion and Fraction
CO4	Understand speed, time and distance concepts
CO5	Summarize the concepts of Business aptitude using basic aptitude
CO6	Solve the aptitude problems on Geometry and Venn Diagram

Course Contents:

Unit 1: Speed Math Techniques Multiplication, Squares, Square roots, Cubes, Cube roots	[1]
Unit 2: Number System Types of Number System, Last Digit Method, BODMAS Calculation, HCF and LCM, Progressions	[2]
Unit 3: Basic Aptitude Percentage, Average, Ratio and Proportion, Fraction, Partnership	[3]
Unit 4: Speed- Time- Distance Speed, Time, and Distance, Trains, Boats, Streams, Races	[2]
Unit 5: Business Aptitude Profit & Loss, Simple Interest, Compound Interest	[2]
Unit 6: Geometry and Venn Diagram 2D and 3D Mensuration, Venn diagram	[2]

Text Books:
1. Arun Shrama - Quantitative aptitude for CAT.
2. RS Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S. Chand Publisher; 2016 edition
3. RS Aggarwal, Quantitative Aptitude for Competitive Examinations, S. Chand Publisher; 2016 edition

Reference Books:
1. Fast Track Objective Arithmetic Paperback, by Rajesh Verma – 2018
2. Teach Yourself Quantitative Aptitude, Arun Sharma

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Language Skills- II

HMS04	HSMC	Language Skills- II	0-0-2	1 Credit

Teaching Scheme:	Examination Scheme:
Practical: 2 hrs/week	Continuous Assessment 1= 25 marks Continuous Assessment 2= 25 marks

Pre-Requisites: Communication Skills, Language Skills- I

C Programming (Technical Language) (24Hrs)

Syllabus for C Programming

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

CO 1	Illustrate the concept of Function Types, and its type
CO 2	Make use of Structures and Unions.
CO 3	Make use of Pointers
CO 4	Illustrate the concept of File handling in C programming.

Course Contents:

Unit 1: Function Editing, Basic of functions, Types of functions, returning non-integers external variables, scope rules, Recursion Function.	[6]
Unit 2: Structures and Unions Variable Defining a Structure, Advantage of Structure, Size of Structure, Arrays of Structures, Structures and Functions, Defining Unions.	[6]
Unit 3: Pointers Pointers to integers, characters, floats, arrays, structures.	[6]
Unit 4: File handling Initializing Introduction to dynamic memory allocation- Malloc, Calloc, Realloc, Introduction to file management, Opening/Closing a file, Input/ Output operations on Files, Error handling during I/O Operations.	[6]

Text Books
1. C Programming Absolute Beginner's Guide, Que Publishing; 3rd edition (22 August 2013)
2. C Programming Language 2nd Edition, Peasrson Publication

Reference Books
1. C: The Complete Reference, McGraw Hill Education; 4th edition (1 July 2017)
2. C Programming in easy steps, 5th Edition, In Easy Steps Limited
3. The C Programming Language, Second Edition, By Pearson Education India (1 January 2015)

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Mini Project - III

PRJ03	PROJ	Mini Project - III	0-0-2	1 Credit

Teaching Scheme:	Examination Scheme:
Practical: 2 hrs/week	Continuous Assessment 1: 25 Marks Continuous Assessment 2: 25 Marks

Course Outcomes: Upon successful completion of this course, the students will be able to:	
CO1	Select the appropriate method for solving the problem
CO2	Make use of various engineering techniques and tools to give a solution
CO3	Justify the method/tools used to develop the solution
CO4	Demonstrate tangible solutions to the problem
CO5	Describe the solution with the help of a project report and presentation.

About Mini Project - III

The project is a part of addressing societal and industrial needs. Mini Project - III is one of the platforms that students will use to solve real-world challenges. This course focuses on the selection of methods/engineering tools/analytical techniques for problem-solving. Through this course, students gain a thorough understanding of engineering basics and ideas, gain practical experience, have the opportunity to display their skills and learn about teamwork, financial management, communication skills, and responsibility.

Guidelines
1. Every student shall undertake the Mini Project - III activity for semester IV.
2. The same group of minimum three and maximum of five students who were working for Mini Project - II should work together in Mini Project - III
3. The students have to work on different approaches and finalize the best methodology to solve the problem in consultation with the project guide.
4. The students should use different tools /Techniques for the development of the solution to the problem.
5. While developing solutions, the student can take care of effective use of resources, follow ethical practices, finance management,
6. The solution should be optimal, affordable, user-friendly and environment friendly.
7. Critically analysis and testing of the solution provided.
8. By using IPR, students should reserve their rights of innovations as well as communicate new findings to society with the help of research papers.

The committee of senior faculty members and a project guide will be appointed to monitor the progress and continuous evaluation of each project. The assessment shall be done jointly by the guide and

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Industrial Training / Field Training - I

IFT01	PROJ	Industrial Training / Field Training - I	0-0-0	Audit

Teaching Scheme:	Examination Scheme:
Lecture: NA	End Semester Exam: 50 Marks

Prerequisite: - Basics of Civil Engineering, Good written and Oral Communication.

CO1	Verify the Technical knowledge in real industrial situations.
CO2	Develop interpersonal communication skills.
CO3	Discuss activities and functions of the industry in which the Internship/training has done.
CO4	Write the technical report.

Internship / Training is educational and career development opportunity, providing practical experience in a field or discipline. At the end of the fourth semester, every student should undergo practical training in an industry / professional organization / Research laboratory with the prior approval of the HoD/TPO/Principal of the college and submit the report along with the completion certification from the Industry/ Organization. The report will be evaluated during the fifth semester by the department.

Guideline for Students:-
1. Arrive at work as per schedule, ready to work and stay for the agreed upon time.
2. Present yourself in a professional manner at all times, including being appropriately dressed atworkplace.
3. Communicate any concerns with your supervisor and the internship/Training coordinator in a timely manner and respectfully.
4. Demonstrate enthusiasm and interest in what you are doing, ask questions and take the initiative as appropriate.
5. Complete and submit assigned tasks by designated timelines. Meet all deadlines.

Student's Diary/ Daily Log:
The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students should record in the daily training diary the day to day account of the observations, impressions, information gathered and suggestions given, if any. It should contain the sketches & drawings related to the observations made by the students. The daily training diary should be signed after every day by the supervisor/ in charge of the section where the student has been working. The diary should also be shown to the Faculty Mentor. Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the SITCOE immediately after the completion of the training. It will be evaluated on the basis of the following criteria:
•Regularity in maintenance of the diary.
•Adequacy & quality of information recorded.
•Drawings, sketches and data recorded.
•Thought process and recording techniques used.
•Organization of the information.

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Internship Report

After completing the internship, the student should prepare a comprehensive report to indicate what he/she has observed and learned in the training period. Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The competent authority should sign the training report. The Internship report should be evaluated on the basis of following criteria:

i. Originality.

ii. Adequacy and purposeful write-up.

iii.Organization, format, drawings, sketches, style, language etc.

iv.Variety and relevance of learning experience.

v. Practical applications, relationships with basic theory and concepts taught in the course.

Evaluation of Internship/Training

The student should be evaluated based on his training report and presentation, before an expert committee constituted by the concerned department as per norms. The evaluation will be based on the following criteria:

• Quality of content presented.

• Proper planning for presentation.

• Effectiveness of presentation.

• Depth of knowledge and skills.

• Attendance record, daily diary, departmental reports shall also be analyzed along with the Internship Report.

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