

# Civil, Electrical & Mechanical Engineering Department

## 1st Semester Teaching Scheme

### Division A

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
MA 181001	Mathematics (Calculus)	3	2	0	5
PH 181001	Physics-I	2	1	0	3
HS 181001 / HS 181002	Indian English Literature & Language / Functional English & Comprehension	3	0	2	4
CE 181001 / EE 181001 / ME 181001	I to I civil/Elec/Mech	2	0	0	2
PH 181101	Physics Laboratory	0	0	3	1.5
CH 181001	Chemistry	3	1	0	4
GE 181001	Engineering Graphics	2	0	3	3.5
CH 181101	Chemistry Laboratory	0	0	3	1.5
	<b>Total</b>	<b>15</b>	<b>4</b>	<b>11</b>	<b>24.5</b>

### Division B

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
MA 181001	Mathematics (Calculus)	3	2	0	5
PH 181001	Physics-I	2	1	0	3
HS 181001 / HS 181002	Indian English Literature & Language / Functional English & Comprehension	3	0	2	4
CE 181001 / EE 181001 / ME 181001	I to I civil/Elec/Mech	2	0	0	2
PH 181101	Physics Laboratory	0	0	3	1.5
CS 181001	Computer Science	2	1	3	4.5
GE 181002	Manufacturing Science and Workshop	2	0	3	3.5
	<b>Total</b>	<b>14</b>	<b>4</b>	<b>11</b>	<b>23.5</b>

# Civil, Electrical & Mechanical Engineering Department

## 2nd Semester

### Teaching Scheme

#### Division A

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
MA 181002	Mathematics (ODE+Linear Algebra with V. calculus)	4	2	0	6
PH 181002	Physics-II	3	2	0	5
EE 181002	Basic Electrical And Electronics Engineering	2	1	2	4
CS 181001	Computer Science	2	1	3	4.5
GE 181002	Manufacturing Science and Workshop	2	0	3	3.5
	<b>Total</b>	<b>13</b>	<b>6</b>	<b>8</b>	<b>23</b>

#### Division B

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
MA 181002	Mathematics (ODE+Linear Algebra with V. calculus)	4	2	0	6
PH 181002	Physics-II	3	2	0	5
EE 181002	Basic Electrical And Electronics Engineering	2	1	2	4
CH 181001	Chemistry	3	1	0	4
GE 181001	Engineering Graphics	2	0	3	3.5
CH 181101	Chemistry Laboratory	0	0	3	1.5
	<b>Total</b>	<b>14</b>	<b>6</b>	<b>8</b>	<b>24</b>

## Mathematics Curriculum for Semester - I

I	Course Code	<b>MA 181001</b>			
II	Course Title	<b>Mathematics I : Calculus</b>			
III	Credit Structure	L	T	P	C
		3	2	0	5
IV	Course Content	<ol style="list-style-type: none"> <li>1. Limit, Continuity, Limit at infinity, infinite limits, asymptotes, limit of sequences, Continuity and differentiability, IVT</li> <li>2. Linear Approximation and differentials, Maximum and Minimum Values, The Mean Value Theorems, Increasing and decreasing functions, concavity and curve sketching ,Indeterminate Forms and L'Hospital's Rule, Taylor's theorem</li> <li>3. Area, Riemann sums, the definite integral, the fundamental theorem of calculus</li> <li>4. Application of Definite integrals-Areas between Curves, Volumes</li> <li>5. Volumes by Cylindrical Shells, Work, Average Value of a Function, Arc Length, Area of a Surface of Revolution, Improper Integrals.</li> <li>6. Three-Dimensional Coordinate Systems, Equations of Lines and Planes, Cylinders and Quadric Surfaces, Cylindrical Coordinates, Spherical Coordinates</li> <li>7. Functions of Several Variables, Limits and Continuity, Partial Derivatives, Tangent Planes and Linear Approximations, The Chain Rule, Directional Derivatives and the Gradient Vector</li> <li>8. Vector functions, Vector Functions and Space Curves, Derivatives and Integrals of Vector Functions, Arc Length and Curvature, Motion in Space: Velocity and Acceleration</li> <li>9. Vector fields, Gradient, Curl and Divergence</li> <li>10. Extreme values and saddle points of functions of several variables, Constrained optimization, Lagrange Multiplier Method.</li> </ol>			
V	Text/References	<ol style="list-style-type: none"> <li>1. Thomas, G.B., and Finney, R.L., Calculus and Analytic Geometry, 9th Edition, ISE Reprint, Addison-Wesley, 1998.</li> <li>2. Stewart, J., Calculus, 5th Edition, Thomson, 2003.</li> <li>3. Marsden, J.E., Tromba, A.J., and Weinstein, A., Basic multivariable calculus, Springer India, 2004.</li> <li>4. Apostol, T.M., Calculus, Volumes 1 and 2, 2nd Edition, Wiley Eastern, 1980.</li> <li>5. Hughes-Hallett et al, Calculus - Single and Multivariable (3rd Edition), John- Wiley and Sons 2003</li> </ol>			

## Mathematics Curriculum for Semester II

I	Course Code	<b>MA 181002</b>			
II	Course Title	<b>Mathematics II: Linear Algebra with vector calculus and ODE</b>			
III	Credit Structure	L	T	P	C
		4	2	0	6
IV	Prerequisites	MA 1001			
V	Course Content	<p><b>Linear Algebra with Vector Calculus:</b>                      Double Integrals over Rectangles, Iterated Integrals, Double Integrals over General Regions, changing the order of integration, Change of Variables in Multiple Integrals, Double Integrals in Polar Coordinates, Applications of Double Integrals                      Triple Integrals, Triple Integrals in Cylindrical Coordinates, Triple Integrals in Spherical Coordinates, Applications                      Line Integrals, The Fundamental Theorem for Line Integrals, conservative vector fields and path independence, Green's Theorem                      Parametric Surfaces and Their Areas, Surface Integrals, Stokes' Theorem, The divergence theorem                      Vectors in <math>\mathbb{R}^3</math>, Systems of Linear equations, Matrices and Gauss elimination, Elementary matrices, Determinants and rank of a matrix Eigenvalues and eigenvectors, Characteristic polynomials, Eigenvalues of special matrices, Multiplicity, Diagonalizability                      Abstract vector spaces, Subspaces, Linear independence, dependence, basis and dimension                      Linear transformations, Matrix of a linear transformation, Change of basis and similarity, Rank-nullity theorem                      Inner product spaces, Gram-Schmidt process, Orthonormal Bases, Diagonalization, Spectral theorem, Quadratic forms</p> <p><b>ODE:</b>                      Exact equations, Integrating factors and Bernoulli's equation Orthogonal trajectories; Lipschitz condition, Picards theorem, Reduction of order                      Linear ODEs with constant coefficients, Cauchy-Euler equations                      Wronskians, Abel-Liouville formula, Method of undetermined coefficients, Method of variation of parameters                      Laplace transforms, Shifting theorems, Convolution theorem</p>			
V	Text/References	<ol style="list-style-type: none"> <li>1. Anton, H., Elementary linear algebra with applications, 8th edition, John Wiley &amp; Sons, 1995.</li> <li>2. David Poole, Linear Algebra:A modern Introduction, Cengage Learning, 4th edition</li> <li>3. Apostol, T.M., Calculus, Volume 2, 2nd Edition, Wiley Eastern, 1980.</li> <li>4. Boyce, W.E., and DiPrima, R., Elementary Differential Equations, 9th Edition, John Wiley &amp; Sons, 2005.</li> <li>5. Kreyszig, E., Advanced Engineering Mathematics, (9th Edition), Wiley India</li> <li>6. Strang, G., Linear algebra and its applications, 4th Edition, Thomson, 2006.</li> </ol>			

## Physics Curriculum for Semester I

I	Course Code	<b>PH 181001</b>			
II	Course Title	<b>Physics - I</b>			
III	Credit Structure	L	T	P	C
		2	1	0	3
IV	Prerequisite(If any for the student )	Nil			
V	Course Content	<p>Special Theory of Relativity: Problems with classical physics, Inertial and non-inertial frames of reference, Postulates of special theory of relativity, Galilean and Lorentz transformation, Length contraction and Time dilation, Relativistic addition of velocities, Energy momentum relationships.</p> <p>Quantum Mechanics: Black-body radiation, Photoelectric effect and Compton effect, Wave nature of matter, Davisson-Germer experiment, Group and Phase velocities, Heisenberg's uncertainty principle, Schrodinger equation, Wave function and Normalization, Probability density and probability, Operators, Expectation values, Eigenvalues and Eigenfunctions, Particle in infinite and finite square wells, Particle in one, two and three dimensional box, Degenerate states, Potential barrier, Tunneling through a barrier, Eigenvalue and Eigenfunction of 1D simple harmonic oscillator without complete derivation.</p>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. C. Richtmyer and Kennard, Introduction to Modern Physics, 6th Edition, McGraw-Hill, 1969.</li> <li>2. R. Eisberg and R. Resnick, Quantum Physics, 2nd Edition, John Wiley 2002.</li> <li>3. H.S. Mani and G.K. Mehta, Introduction to Modern Physics, 1st Edition, East-west Press Pvt. Ltd.-New Delhi, 2000.</li> <li>4. A. Beiser, Concepts of Modern Physics, 6th Edition, Tata McGraw Hill Education Pvt. Ltd., 2009.</li> <li>5. R. P. Feynman, R.B. Leighton, and M. Sands, The Feynman Lectures on Physics -Vol III, Narosa Publishing House, 2010.</li> <li>6. R.A. Serway, C.J. Moses and C.A. Moyer, Modern Physics, 3rd Edition, Thomson Learning, Inc. 2005.</li> </ol>			

## Physics Curriculum for Semester II

I	Course Code	<b>PH 181002</b>			
II	Course Title	<b>Physics- II</b>			
III	Credit Structure	L	T	P	C
		3	2	0	5
IV	Prerequisite(If any for the student )	Nil			
V	Course Content	<p>Vector Calculus: Gradient, Divergence, Curl and Laplacian, Line, Surface and Volume integrals, Gauss-divergence and Stokes theorems, Spherical polar and Cylindrical coordinate systems.</p> <p>Electrostatics: Electric field and Gauss's law, Electrostatic potential, Multipole expansion, Electrostatic energy, Conductors, Uniqueness theorem, Laplace's solution, Image method, Electrostatic boundary conditions, Electrostatic Fields in matter, Capacitors.</p> <p>Magnetostatics: Lorentz force law, Continuity equation, The Biot- Savart's law, Ampere's law, Magnetic vector potential, Magnetism in materials, Magnetostatic boundary conditions.</p> <p>Electrodynamics: Electromotive force, Faraday's law and Lenz's law, Inductance, Displacement current, Maxwell's equations, Electromagnetic (EM) waves in vacuum and media.</p>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. D. J. Griffiths, Introduction to Electrodynamics, 3rd Edition, PHI Learning, 2009.</li> <li>2. J. R. Reitz, F. J. Milford, R.W. Christy: Foundations of Electromagnetic Theory, 4th Edition, Pearson Addison Wesley, 2009.</li> <li>3. A. Mahajan, A. Rangwala, Electricity and Magnetism, 1st Edition, Tata McGraw Hill, 1988.</li> <li>4. E. M. Purcell, Berkeley Physics Course, Electricity and Magnetism, Volume 2, 2nd Edition, Tata McGraw Hill, 2007.</li> <li>5. R. P. Feynman, R.B. Leighton, and M. Sands, The Feynman Lectures on Physics -Vol II, Narosa Publishing House, 2010.</li> </ol>			

## Physics Practical Curriculum for Semester I

I	Course Code	<b>PH 181101</b>			
II	Course Title	<b>Physics Laboratory</b>			
III	Credit Structure	L	T	P	C
		0	0	3	1.5
IV	Prerequisite(If any for the student )	Nil			
V	Course Content	<ol style="list-style-type: none"> <li>1. Compound Pendulum: Determine the acceleration due to gravity and the radius of gyration of the given compound pendulum.</li> <li>2. Young's Modulus by Koenig's Method: Determine Young's modulus of the material of a rectangular bar by Koenig's method.</li> <li>3. Thermal Conductivity by Lee's Disc: Measure the thermal conductivity of a poor conductor by electrically heated Lee's disc apparatus.</li> <li>4. Kundt's Tube: Measure the velocity of sound in air using Kundt's tube apparatus and calculate the "<math>\gamma</math>" of air at room temperature.</li> <li>5. Helmholtz Coil: Verify the principle of superposition and to examine the uniformity of the magnetic field produced by Helmholtz coils.</li> <li>6. Fresnel's Biprism: Determine the wavelength of light using Fresnel's bi- prism.</li> <li>7. Hydrogen Spectrum: Measure the wavelengths of visible spectral lines in Balmer series of atomic hydrogen and to determine the value of Rydberg's constant.</li> <li>8. Grating Spectrometer: Determine the wavelengths of spectral lines of mercury and the angular dispersive power of a diffraction grating.</li> <li>9. Single Slit Diffraction: Study the diffraction at a single slit and verify Heisenberg's uncertainty principle.</li> <li>10. Four Probe Method: Study the resistivity of the semiconductor by Four Probe Method at different temperatures and determine the band gap.</li> <li>11. Photoelectric Effect: Determine the value of Planck's constant using photoelectric effect.</li> <li>12. Hall Effect: Determine the carrier concentration and type of carrier using Hall effect.</li> </ol>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. Practical Physics, G. L. Swuires, 4th Edition, Cambridge University Press,2012.</li> <li>2. Physics, Vols 1 &amp; 2, D. Holliday, R. Resnick and K. S.Krane, John Wiley and Sons, 5th Edition, 2002.</li> <li>3. Optics, Ajoy Ghatak, 5th Edition, Tata McGraw Hill, 2012.</li> <li>4. Introduction to Geometrical and Physical Optics, B. K. Mathur, Gopal Printing, 1967.</li> <li>5. Introduction to Solid State Physics, C. Kittel 8th Edition, Wiley Publications,2004.</li> </ol>			

## Chemistry Curriculum for Semester I & II

I	Course Code	<b>CH 181001</b>			
II	Course Title	<b>Chemistry</b>			
III	Credit Structure	L	T	P	C
		3	1	0	4
IV	Prerequisite(If any for the student )	Nil			
V	Course Content	<p>Chemical Kinetics: Rate laws, Rate constant and equation, order and molecularity, Complex reactions, Arrhenius equation, collision theory, Reaction cross section, Harpoon mechanism, Organic reaction mechanism Catalysis: Homogeneous and Heterogeneous Catalysis, Adsorption, Biocatalysis, Important Industrial applications (at least two), Catalytic converter</p> <p>Basics of Spectroscopy: Rotational, Vibrational and Electronic spectroscopy</p> <p>Basics of Electrochemistry, Fuel Cell, Corrosion and its prevention</p> <p>Water and its treatment</p> <p>Polymer: Classification, Molecular weight and MWD, Thermal and mechanical properties, Compounding of polymer, Commodity plastic and engineering plastic</p>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. Elements of Physical Chemistry, P.W. Atkins &amp; De Paula, Oxford, 2017.</li> <li>2. Heterogeneous Catalysis, D. K. Chakravarty &amp; B. Vishwanathan, New Age International, 2011.</li> <li>3. Polymer Science - V. R. Gowarikar, N. V. Viswanathan &amp; Jayadev Sreedhar, New Age International, 2006 (reprint).</li> <li>4. Organic Chemistry, R. T. Morrison &amp; R. N. Boyd, Pearson Education India, 2010.</li> <li>5. Fundamentals of molecular spectroscopy, C. N. Banwell &amp; E. M. McCash, McGraw Hill Education (India) Private Limited, 2013</li> <li>6. Spectroscopy of Organic compounds, P. S. Kalsi, New Age International, 2007.</li> <li>7. Applications Of Absorption Spectroscopy Of Organic Compounds, J. R. Dyre, Prentice Hall India Learning Private Limited, First Edition, 1978.</li> <li>8. Heterogeneous Catalysis: Principles &amp; Applications, G. C. Bond, Clarendon Press ; New York : Oxford University Press, 1987</li> <li>9. Engineering Chemistry, Jain and Jain, Dhanpat Rai Publishing Company, 2015</li> <li>10. A text book of Engineering Chemistry, Shashi Chawla, Dhanpat Rai &amp; Co. (P) Limited, 2017</li> <li>11. Chemical kinetics, K. J. Laidler, Pearson Education India, 2003.</li> </ol>			

## Chemistry Practical Curriculum for Semester I & II

I	Course Code	<b>CH 181101</b>			
II	Course Title	<b>Chemistry Laboratory</b>			
III	Credit Structure	L	T	P	C
		0	3	0	1.5
IV	Prerequisite (if any )	Nil			
V	Course Content	<ol style="list-style-type: none"> <li>1. Complexometric Titration: To estimate hardness of a given water sample by complexometric method</li> <li>2. Estimation of Acetamide: To estimate Acetamide present in a given solution by hydrolysis method</li> <li>3. Organic preparation: To prepare acetanilide from aniline</li> <li>4. Organic preparation: To prepare p-nitro acetanilide from acetanilide</li> <li>5. Chemical Kinetics (Hydrolysis of an Ester): To determine the rate constant and order of reaction for acid catalyzed hydrolysis of methyl acetate</li> <li>6. Potentiometric titration: To determine the normality of hydrochloric acid potentiometrically</li> <li>7. Conductometric titration: To determine the strength of sodium hydroxide solution conductometrically</li> <li>8. Conductometric titration: To determine the milk adulteration by conductivity measurements.</li> <li>9. pH metric titration: To determine the strength of HCl solutions in mixture using pH meter</li> <li>10. Iodometry: To Determine Dissolved Oxygen of a given Water Sample by Winklers Iodometric Method</li> <li>11. Iodimetric Titration: To determine the strength of given ascorbic acid solution by titrating against standard 0.1 N iodine solution</li> <li>12. Chemical Oxygen Demand: To determine the Chemical Oxygen Demand (COD) for a given polluted water sample</li> </ol>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. D.P. Shoemaker, C.W. Garland and J.W. Nibler: Experiments in Physical Chemistry, McGraw Hill International Edition, 1996</li> <li>2. V.D. Athawale and P. Mathur: Experimental Physical Chemistry, 1st Edition, New Age International Publication, New Delhi, 2001.</li> <li>3. J.B. Yadav: Advanced Practical Physical Chemistry, Goel Pub., Meerut, 2003</li> <li>4. S. M. Khopkar: Basic Concepts of Analytical Chemistry, 3rd Edition, New Age International Publication, New Delhi, 2008</li> <li>5. P. Samnani: Experiments in Chemistry, Anmol Publication Pvt. Ltd. New Delhi, 2007</li> </ol>			

## Civil Infrastructure Curriculum for Semester I

I	Course Code	<b>CE 181001</b>			
II	Course Title	<b>Introduction to Civil Infrastructure</b>			
III	Credit Structure	L	T	P	C
		2	0	0	2
IV	Prerequisite (if any )	None			
V	Instructor(s)				
VI	Course Content	<p><b>Unit 1:</b> Introduction to Infrastructure scenario in India. Urban and Rural infrastructure in India. Bird-eye view to various specializations in Civil Engineering discipline and their practical relevance for the infrastructural development. Basics of infrastructure planning.</p> <p><b>Unit 2:</b> Role of Civil Engineering in the following infrastructure sectors:  a) Transportation infrastructure  b) Hydraulic infrastructure  c) Building infrastructure  d) Water supply and wastewater infrastructure  e) Energy infrastructure  f) Smart Infrastructure</p> <p><b>Unit 3:</b> Environmental and sustainability aspects for the design of infrastructure, New challenges for the future infrastructure development</p>			
VII	Text/References	<ol style="list-style-type: none"> <li>1. Irrigation and Hydraulic Structure S K Garg, 1st Edition, Khanna Publishers.</li> <li>2. Environmental Engineering - N.N.Basak, 1st Edition, Mcgraw Higher Ed.</li> <li>3. Highway Engineering S K Khanna and C E Justo, 10th Edition, Nem Chand Brothers.</li> <li>4. Railway Engineering - Satish Chandra and Agrawal, Oxford University Press.</li> <li>5. Building Planning and Drawing: SS Bhavikatti and M. V. Chitawa, I K International Publishing House Pvt. Ltd.</li> <li>6. Reinforced Concrete Design by S. N. Sinha, Tata McGraw Hill.</li> <li>7. Steel Structures-Design and Practice, N. Subramanian, Oxford University Press.</li> <li>8. Textbook of Geotechnical Engineering by B M Das, Cengage Learning.</li> <li>9. Building Materials, S. S. Bhavikatti, Vikas Publishing House.</li> <li>10. Smart Civil Structures by You-Lin Xu and Jia He, CRC Press, Taylor and Francis.</li> </ol> <p>Open source information/literature available through World Wide Web, MOOCS, NPTEL, and Institution Library etc.</p>			

## Electrical Infrastructure Curriculum for Semester I

I	Course Code	<b>EE 181001</b>			
II	Course Title	<b>Introduction to Electrical Infrastructure</b>			
III	Credit Structure	L	T	P	C
		2	0	0	2
IV	Prerequisite(If any for the student )	Nil			
V	Course Content	<p>Introduction to electrical infrastructure requirements in transportation systems, Electrical Energy Scenario, Basics of Electrical Drives, Basic characteristics of DC and 3-phase induction motors, Electrical Traction Systems (Railways, Metro-rails, Tramways), electric power generation, transmission and distribution systems, Information and Communication, environmental aspects, energy considerations, conventional power plants, Renewable energy infrastructure: Solar Parks, Wind Farms, Biogas plants etc., laws of illumination, factory and street lighting, hybrid electric vehicles and electric vehicles, emergency power systems, Central Emergency Power Stations (CEPS), Central Power Stations (CPS) and Central Energy Plant (CEP), Power Control and Monitoring Systems (PCMS).</p>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. "Utilization of Electric Power &amp; Electric Traction" by J.B.Gupta, Katson Publishers.</li> <li>2. "Fundamentals of Internal Combustion Engines" by H.N. Gupta, PHI Publications.</li> <li>3. Utilization of Electrical Power by Soni, Bhatnagar and Gupta</li> </ol>			

## Mechanical Infrastructure Curriculum for Semester I

I	Course Code	<b>ME 181001</b>			
II	Course Title	<b>Introduction to Mechanical Infrastructure</b>			
III	Credit Structure	L	T	P	C
		2	0	0	2
IV	Prerequisite, if any	Nil			
V	Course Content	<p><b>Unit 1: History and overview</b>  Overview of infrastructure requires all of engineering, Classification and different sectors of infrastructure, Developmental role of mechanical infrastructure, Some historically important people and their contributions in infrastructure (Marquis of Pombal, Isambard Kingdom Brunel, Mokshagundam Visvesvaraya, etc.).</p> <p><b>Unit 2: Introduction to Transportation Infrastructure.</b>  <b>Railway Infrastructure:</b>  Introduction to the railway industry, their impacts on the society and on the environment, types of coaches, engine and machines in railway engineering. Involvement in country GDP, Future need of country, creation and maintenance of railway infrastructure.</p> <p><b>Airways Infrastructure:</b>  Introduction to airway infrastructure, need and importance of air transport, basic working and control method of airplane, construction and working of jet engines, method to reduce cost of air transport, socio-economic impact of airways infrastructure, creation and maintenance of airway infrastructure.</p> <p><b>Roadways infrastructure:</b>  Introduction to roadways infrastructure, need and importance of road transport, basic working and control method of commercial and noncommercial vehicle, creation and maintenance of roadway infrastructure.</p> <p><b>Water transport infrastructure:</b>  Introduction to water transport infrastructure, need and importance of water transport, basic working and control method of commercial and non-commercial water vehicles, creation and maintenance of water transport infrastructure.</p> <p><b>Unit 3: Introduction to Energy Infrastructure:</b>  Introduction, types of energy, source of energy, conventional and non-conventional source of energy, working principle thermal, solar, hydroelectric, wind and nuclear power plant, recent advancement and challenge to meet the demand for aforesaid power plant, energy distribution, energy transport, its use for human comfort and maintenance of power plant.</p> <p><b>Unit 4: Case Studies</b>  Different case studies in the field of related infrastructures and one case study assignment for the students.</p> <p><b>Unit 5: Field visits</b>  Field visit to industrial establishment such as power plants, manufacturing and maintenance industry and submission of final report.</p>			
VI	Textbooks/References	<ol style="list-style-type: none"> <li>1. Donaldson, Dave. <i>Railroads of the Raj: Estimating the impact of transportation infrastructure</i>. No. w16487. National Bureau of Economic Research, 2010.</li> <li>2. Banister, David. <i>Transport and urban development</i>. Routledge, 2003.</li> <li>3. Nag, P. K. <i>Power plant engineering</i>. Tata McGraw-Hill Education, 2002.</li> <li>4. Drbal, Larry, Kayla Westra, and Pat Boston, eds. <i>Power plant engineering</i>. Springer Science &amp; Business Media, 2012.</li> <li>5. Vasigh, Bijan, and Ken Fleming. <i>Introduction to air transport economics: from theory to applications</i>. Routledge, 2016.</li> <li>6. Ashford, Norman, and Paul H. Wright. <i>Airport engineering</i>. New York: Wiley, 1979.</li> </ol>			

## Engineering Graphics Curriculum for Semester I & II

I	Course Code	<b>GE 181001</b>			
II	Course Title	<b>Engineering Graphics</b>			
III	Credit Structure	L	T	P	C
		2	0	3	3.5
IV	Prerequisite (if any )	Nil			
V	Course Content	Introduction to the engineering design process and the importance of technical. Graphics/Drawings; Integrated design and 3D modelling, visualization - sketching & computer aided drawing, geometrics - geometry construction, shape description, multi-view drawings - orthographic projection, isometric views, axonometric projections, auxiliary & section views; Dimensioning; Assembly drawings.			
VI	Text/References	<ol style="list-style-type: none"> <li>1. Ostrowsky, O., Engineering Drawing with CAD Applications, Elsevier Science &amp; Technology, 1989</li> <li>2. Banach, D. T., and Jones, T., Autodesk Inventor 2011 Essentials Plus, Cengage Learning, Inc, 2010</li> <li>3. Jensen, C. H., Helsel, J. D., and Short, D. R., Engineering Drawing and Design, 7th edition, McGraw Hill, 2007</li> </ol>			

## Basic Electrical and Electronics Engineering Curriculum for Semester II

I	Course Code	<b>EE 181002</b>			
II	Course Title	<b>Basic Electrical And Electronics Engineering</b>			
III	Credit Structure	L	T	P	C
		2	1	2	4
IV	Prerequisite (if any for the students)	No			
V	Course Content	<p>Elements in an Electrical circuit: R, L, C, Voltage and current sources (independent and dependent/controlled sources with examples). DC circuits, KCL, KVL, Network theorems, Mesh and nodal analysis. Step response in RL, RC, RLC circuits.</p> <p>Basics of semiconductor physics, P-N junction, diode characteristic, diode circuits - clippers. Characteristics of BJTs. Common Emitter, Common collector configurations of BJTs, biasing of BJTs and its small signal modeling. Basics of operational amplifiers.</p>			
VI	Text/References	<p>1 R. J. Smith and R. C. Dorf, Circuits, Devices and Systems, Wiley, 5th edition, 1992.</p> <p>2 E. Hughes, Electrical Technology, Pearson, 7th edition.</p> <p>3 Bobrow, Fundamentals of Electrical Engineering, Oxford Univ Press.</p> <p>4 Hayt, W. H., Kemmerly, J. E., Durbin, S. M., Engineering Circuit Analysis, sixth edition, Tata Mc-Graw Hill, 2006.</p> <p>5 R. Prasad, Fundamentals of Electrical Engineering Book, Prentice Hall India Learning Private Limited; Third edition (2014)</p>			

## Computer Science Curriculum for Semester I & II

I	Course Code	<b>CS 181001</b>			
II	Title of Course	<b>Computer Science</b>			
III	Credit Structure	L	T	P	C
		2	1	3	4.5
IV	Prerequisite(for the student)	Concept of algorithm			
V	Course Content	<ol style="list-style-type: none"> <li>1. Introduction to the state of the art in computing focusing on hardware and its architecture, operating systems, memory management. Numeric information representation in computers : 2s complement representation of integers and IEEE 754 standard for representing floating point numbers. ASCII and Unicode systems for representing character data.</li> <li>2. Computers, algorithms and programming. A programmers view of a computer system. Lower Level and higher level programming languages, general characteristics of programming languages and classification of programming constructs.</li> <li>3. Scalar and non-scalar data, variables, types and objects. Arithmetic, relational, logical and assignment operators. Strings, string operations and slicing.</li> <li>4. Data structures, supported operations. Mutable and immutable types. Lists, tuples, dictionaries and sets. Iterables and iterative traversal of sequential structures.</li> <li>5. Conditional and iterative control structures. Nested controls. Break and continue statements.</li> <li>6. Library modules and their use. User defined functions and modular programming. Developing function libraries. Recursive functions.</li> <li>7. Algorithms and their implementation. Introduction to algorithmic complexity and computational complexity. Euclids algorithm, prime number programs.</li> <li>8. Classes and objects. Object oriented programming. Inheritance.</li> <li>9. Scientific and engineering computation examples. Numpy and Scipy libraries. Computations with multi-dimensional arrays.</li> <li>10. Reading and writing files. Matplotlib library for plotting graphs, and displaying images. Handling CSV files with Pandas library.</li> </ol>			
VI	Text Books and web resources	<ol style="list-style-type: none"> <li>1. John V Guttag, Introduction to Computation and Programming Using Python, 2 Edition, Prentice Hall India &amp; MIT Press, 2014.</li> <li>2. Mark Lutz . Learning Python: Powerful Object-Oriented Programming: 5th Edition, OReilly/SPD, 2013</li> <li>3. <a href="https://docs.python.org/3/">https://docs.python.org/3/</a> Python 3.6 online documentation.</li> <li>4. <a href="https://docs.python.org/3/tutorial/index.html">https://docs.python.org/3/tutorial/index.html</a> Python online tutorial</li> <li>5. Python tutorials with Jupyter notebooks</li> </ol>			
VII	MOOCs	<ol style="list-style-type: none"> <li>1. <a href="http://www.edx.org">www.edx.org</a>, Introduction to Computer Science and Programming Using Python, Free online course offered by Eric Grimson, John Guttag from MIT.</li> <li>2. <a href="http://www.coursera.org">www.coursera.org</a> Programming for Everybody (Getting Started with Python), <u>Charles Severance</u>, University of Michigan</li> </ol>			
VIII	Software Resources	Jupyter notebooks			

## Manufacturing Science and Workshop Curriculum for Semester I & II

I	Course Code	<b>GE 181002</b>			
II	Course Title	<b>Manufacturing Science and Workshop</b>			
III	Credit Structure	L	T	P	C
		2	0	3	3.5
IV	Prerequisite, if any	NIL			
V	Course Content	<p><b>Introduction to manufacturing processes:</b> Brief history of manufacturing, product design and concurrent engineering, Selection of materials, significance of material properties with respect to selection of manufacturing processes. <b>Safety:</b> Importance of safety and general Safety considerations in manufacturing.</p> <p><b>Traditional Manufacturing process:</b>  <b>Fitting Tools &amp; Equipment,</b> practice in filing, making 'V' Joints, Square, Dovetail joints and key making plumbing. <b>Carpentry Tools and Equipment-</b> Planning practice, Making Half Lap, Dovetail, Mortise &amp; Tenon joints.</p> <p><b>Principles of heat treating;</b> annealing, normalizing, hardening and tempering.</p> <p><b>Casting Process:</b> Basic concepts of castings, patternmaking, types of Pattern, Pattern allowances, Moulding sand, Types and properties of Moulding sand, cores, elements of gating system, Defects in casting system, special types of casting processes.</p> <p><b>Metal Forming Process:</b> Basic concepts of plastic deformation. Hot &amp; cold working. Common bulk deformation processes (Rolling, Forging, Extrusion and Drawing). Common sheet metal forming processes.</p> <p><b>Machining Process :</b> Mechanics of cutting, cutting forces and power, cutting tool materials and cutting fluids, Tools geometry, Tool life: wear and failure</p> <p><b>Traditional machining process:</b> Turning process, Lathe and lathe operations, Boring and Boring Machine, Drilling and Drilling machines, Milling and Milling Machines, Planing and shaping, Broaching and Broaching machines, Grinding &amp; other Finishing processes.</p> <p><b>Welding &amp; Other Joining Processes:</b> Fundamentals &amp; classification of Joining processes, Welding- Gas arc &amp; resistance welding, Brazing and soldering, Adhesive bonding, Mechanical fastening.</p> <p><b>Manufacturing of Polymer and Powder Products:</b> Classification of polymers, Introduction to extrusion, injection molding, blow molding, compression and transfer molding.</p> <p>Powders &amp; Green compacts from powders including slip casting of ceramics. Sintering.</p> <p><b>Modern Trends in Manufacturing:</b>  <b>Non-Traditional machining process:</b> Need of Non-Traditional machining process, Working principle, advantages and disadvantages of ECM (Electro chemical machining), EDM (Electrical-discharge machining), LBM (Laser Beam Machining), EBM (Electron Beam Machining).  <b>Non Traditional Forming Process:</b>  Working principle, advantages and disadvantages of Explosive Forming process  <b>Non-Traditional Joining process</b>  Working principle, advantages and disadvantages of LBW (Laser Beam welding process)</p> <p><b>Fabrication of Microelectronic devices:</b> Semiconductors and silicon, crystal growing and wafer preparation, film deposition, Lithography, etching, Diffusion and ion implantation, Printed Circuit Boards.</p> <p><b>Additive manufacturing:</b> Introduction to the Basic Principles of Advanced/Additive Manufacturing. Advantages, disadvantages and its application.</p> <p><b>Automation of manufacturing process and operations:</b> Automation, Numerical control: Advantages and Disadvantages of NC system, comparison between conventional and NC machines, Adaptive control.</p> <p>Industrial Robots: structure of robot and its application in manufacturing.</p> <p>Computer-aided manufacturing, Computer integrated manufacturing systems</p>			

VI	Text/References	<ol style="list-style-type: none"><li>1. Schey, J. A., Introduction to Manufacturing Process, 3rd Edition, McGrawHill, 2000.</li><li>2. Serope Kalpakjian, Steven R. Schmid, Manufacturing Engineering and Technology, 7th Edition, Pearson, 2018.</li><li>3. B. S. Nagendra Parashar, R. K. Mittal, Elements of Manufacturing Processes, PHI, 2016.</li><li>4. Singh, D. K., Fundamentals Of Manufacturing Engineering, Ane Books Pvt Ltd, new Delhi, 2nd Ed., 2009.</li><li>5. Hajra Choudhary, S. K., Elements of Workshop Technology, Media Promoters &amp; Publishers Pvt Ltd, 12th Edition, 2002.</li></ol>
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## Indian English Literature & Language for Semester I

I	Course Code	<b>HS 181001</b>			
II	Course Title	<b>Indian English Literature &amp; Language</b>			
III	Credit Structure	L	T	P	C
		3	0	2	4
IV	Course Coordinator	Dr. Meera Vasani			
V	Course Objective	To have in depth practice of extensive reading and writing			
VI	Course Contents	<p>Literature Units: (Can be revised every year)</p> <ul style="list-style-type: none"> <li>● The Last Tonga Ride (Ruskin Bond)</li> <li>● I have Three Visions for India (A P J Abdul Kalam)</li> <li>● The shroud (Munshi Premchand)</li> <li>● First Selfie in Space (Sujata Reddy)</li> <li>● My Birth Place (Nirad C. Chaudhuri)</li> <li>● A Wrong Man in Workers Paradise (Rabindranath Tagore)</li> <li>● Toasted English ( R. K. Narayan)</li> <li>● Crime and Punishment (R. K Narayan)</li> <li>● Grammar of Anarchy (B R Ambedkar)</li> <li>● Punishment in Kindergarten (Kamala Das)</li> </ul> <p>Grammar:</p> <ul style="list-style-type: none"> <li>● Idioms &amp; Phrases, Synonyms, Antonyms, One word substitution, Technical Vocabulary, Homophones, Direct-Indirect, Punctuation</li> </ul> <p>Writing:</p> <ul style="list-style-type: none"> <li>● Report Writing</li> <li>● Letter Writing</li> <li>● Precis</li> <li>● Note-making</li> <li>● Paragraph Writing</li> <li>● Statement of Purpose</li> </ul>			
VII	Text/References	<ol style="list-style-type: none"> <li>1. T. Vijay Kumar, K. Durga Bhavani, YL Srinivas (Ed); English in Use; Macmilan Education</li> <li>2. J Kumar Singh, F Bharateeya, D Trivedi (Ed); College Collage; Macmillan Education</li> <li>3. H. Raviya, A. Pandya, et.al (Ed); Mosaic; Macmillan</li> <li>4. Spectrum- A textbook for college students; Macmillan education</li> <li>5. Thomas L. Means, Ed. D.; English and Communication for colleges; Cengage</li> <li>6. M. Hemamalini; Technical English; Wiley</li> <li>7. Grammar books for practice</li> </ol>			

## Functional English & Comprehension for Semester I

I	Course Code	<b>HS 181002</b>			
II	Course Title	<b>Functional English &amp; Comprehension</b>			
III	Credit Structure	L	T	P	C
		3	0	2	4
IV	Prerequisites (if any)	Basic knowledge of English.			
IV	Course Coordinator	Dr. Meera Vasani			
V	Course Objective	<ul style="list-style-type: none"> <li>● To understand the use of basic grammar.</li> <li>● To comprehend the concepts written in the second language.</li> <li>● Make them more towards the correct usage of grammar in both verbal and written communication.</li> <li>● Introduce them with the phonetics so as to lead them to the correct pronunciation of words.</li> </ul>			
VI	Course Contents	<p><b>Part I. Grammar Topics :</b></p> <ul style="list-style-type: none"> <li>● Articles; Tenses; Prepositions; Modals; Moods of Verb; Concord</li> <li>● Active Passive; Direct-Indirect; Punctuation</li> <li>● Idioms and phrases; phrasal verbs; Synonyms; Antonyms; words often confused; homophones;.</li> <li>● Common errors;</li> <li>● Jumbled Sentences;</li> <li>● Comprehensions</li> </ul> <p><b>Part II. Writing Section:</b></p> <ul style="list-style-type: none"> <li>● Email writing</li> <li>● Sentence Completion</li> <li>● Paragraph Completion</li> <li>● Notice writing</li> <li>● Note Making</li> <li>● Message writing</li> <li>● Letter Writing</li> </ul> <p>Lab Activities: Grammar exercises; Comprehension exercises; general etiquettes; greetings; self-introduction; basic conversation;</p>			
VII	Text/References	<ol style="list-style-type: none"> <li>1. Competitive English; Edi. Pradyumansinh Raj; Azhar Siddiqui, Shaili Kaviya ad.; Macmillan Publisher India Pvt. Ltd.; latest edition.</li> <li>2. Technical English: Vocabulary and Grammar. By Nick Brieger &amp; Alison Pohl. Publication Details: Cengage Learning, 2014.</li> <li>3. Grammar Books with exercises</li> </ol>			

# BACHELOR OF TECHNOLOGY

Civil Engineering Department

Semester - VIII

Course Scheme

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
CE 214502	BTP - 2	0	0	0	16
	<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>16</b>

# BACHELOR OF TECHNOLOGY

## Civil Engineering Department

### Semester - VII

### Course Scheme

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
GE XXXXXX	Open Elective	3	0	0	3
CE 214001	Design of Steel Structure	3	1	0	4
CE 214002	Irrigation and Water Supply Engineering	3	2	0	5
CE XXXXXX	Department Elective-2	3	0	0	3
CE 214501	BTP - 1	0	0	0	8
	<b>Total</b>	<b>12</b>	<b>3</b>	<b>0</b>	<b>23</b>

## Civil Engineering Department

### Semester : V

I	Course Code	<b>CE 214001</b>			
II	Course Title	<b>Design of Steel Structure</b>			
III	Credit Structure	L	T	P	C
		3	1	0	4
	Prerequisite(If any for the student )	Engineering Mechanics and Strength of Materials			
V	Course Content	<ul style="list-style-type: none"> <li>• <b>Introduction:</b> Properties of structural steel, Factor of safety, Loads and load combinations, Introduction to working stress method, Introduction to different types of steel structures and members</li> <li>• <b>Concepts of Limit State Design:</b> Ultimate limit state and serviceability limit state, Partial safety factors, Concept of plastic analysis of beams and frame structures</li> <li>• <b>Connection Design:</b> Types of connections: bolted and welded connections; Efficiency of connection, Design of simple connection, Design of eccentric connection, Design of column base</li> <li>• <b>Design of Tension Member:</b> Steel members subjected to axial tension, Limit state design of tension member</li> <li>• <b>Design of Compression Member:</b> Steel members subjected to axial compression, Eulers theory, Effective length, Slenderness ratio, Mode of failure for a column, Limit state design of compression members, Design of built-up compression members: laced and battened columns, Design for compression with bending</li> <li>• <b>Design of Truss:</b> Introduction to types of loading on industrial structures with truss, Effect of wind load, Design of truss members, Types of connection in truss, Design of truss connection</li> <li>• <b>Design of Flexure Member (Beam):</b> Limit state design of unrestrained and restrained beams, Design of Beam-Column, Design of base plate, Introduction to design of plate girder</li> <li>• <b>Design Project:</b> Analysis of assigned steel structure using Staad Pro. software, Design of typical compression, tension and flexural member from the assigned steel structure using MS excel/Matlab program and manual calculations</li> </ul>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. IS 800-2007, General Construction in Steel – Code of Practice, Bureau of Indian Standards, New Delhi</li> <li>2. IS 875 - Part I to V, Indian Standard Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Bureau of Indian Standards, New Delhi</li> <li>3. N. Subramanian, Steel Structures - Design and Practice, Oxford University Press, New Delhi</li> <li>4. G. Ballio and F M Mazzolani, Theory and Design of Steel Structures, Chapman and Hall, London</li> <li>5. S. K. Duggal, Design of Steel Structures, Tata McGraw-Hill Publishing Company Limited, New Delhi</li> <li>6. S. Ramamrutham, Design of Steel Structures, Dhanpat Rai Publishing Company, New Delhi</li> </ol>			

		<p>7. S. S. Bhavikatti, Design of Steel Structures (By Limit State Method as Per IS: 800-2007), I. K. International Publishing House Private Limited, New Delhi</p> <p>8. L. S. Negi, Design of Steel Structures, Tata McGraw-Hill Publishing Company Limited, New Delhi</p> <p>9. Other relevant Indian Standard codes</p>
<b>VII</b>	<b>Any other Remarks:</b>	

## Civil Engineering Department

### Semester : V

I	Course Code	<b>CE 214002</b>			
II	Course Title	<b>Irrigation and Water Supply Engineering</b>			
III	Credit Structure	L	T	P	C
		3	2	0	5
	Prerequisite(If any for the student )	Fluid Mechanics and Hydrology and Hydraulic Structures			
V	Course Content	<p><b>Part-I Irrigation Engineering:</b></p> <ul style="list-style-type: none"> <li>• <b>Introduction:</b> Definition, Necessity of irrigation, Types of irrigations, Techniques of water distribution in the farms.</li> <li>• <b>Irrigation Demand:</b> Crop water requirement, Duty, Delta, Irrigation Efficiencies, Optimal water use, Consumptive use and its estimation, Consumptive Irrigation Requirement, Net Irrigation Requirement, Soil-Moisture-Irrigation Relationship.</li> <li>• <b>Canal Irrigation System:</b> Important definitions of canal irrigation system, Alluvial and Non-alluvial Canals, Alignment of canals, Distribution system for Irrigation canals, Design capacity of Irrigation Canal, Losses of water in canals, Canal regulation.</li> <li>• <b>Sediment transport in Irrigation Channels:</b> Importance, Forms of bed formation, Mechanics of Sediment Transport, Shield's Entrainment motion, Estimation of Suspended and Bed Loads,</li> <li>• <b>Design of Irrigation Channels:</b> Stability of channel slopes, Design of stable channels, Design procedure for irrigation canals, Maintenance of irrigation canals.</li> <li>• <b>Lining of Irrigation Channels:</b> Advantages and Economics of Lining, Design of Lined Canals, Different Types of Linings, Construction Methods and Usefulness of Lining of Irrigation Canals.</li> </ul> <p><b>Part-II Water Supply Engineering:</b></p> <ul style="list-style-type: none"> <li>• <b>Estimation of water demand:</b> Various types of demands, Per-capita demand and factors affecting it. Variation in demands, Design periods, Population forecasting methods.</li> <li>• <b>Transporting water through conduits:</b> Various types of conduits, Hydraulics of Flow, Flow in pipe system, Factors acting on pressure conduits, Types of pipes and pipe appurtenances.</li> <li>• <b>Distribution system for water supply:</b> Layout of distribution networks, Methods of water distributions, Pressure in the distribution system, System of Supply, Distribution reservoirs, Wastage of water in distribution networks, Design and analysis of distribution networks, Appurtenances in the distribution system.</li> </ul>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. Irrigation Engineering and Hydraulic Structures, Santosh Kumar Garg, Khanna Publishers.</li> <li>2. Irrigation Theory and Practice, by A. M. Michael, Vikas Publishing House.</li> <li>3. Water Supply Engineering, Santosh Kumar Garg, Khanna Publishers.</li> <li>4. Design of Water Supply Pipe Networks, Prabhata K. Swami and Ashok K. Sharma, Wiley and Sons Inc. Publication.</li> </ol>			

VII	Any other Remarks:	
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# BACHELOR OF TECHNOLOGY

## Civil Engineering Department

### Semester - VI

### Course Scheme

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
HS XXXX	HSS (Elective)	3	0	0	3
CE XXXX	Department Elective-1	3	1	0	4
CE 213001	Reinforced Concrete Design	3	2	0	5
CE 213002	Construction Management & Costing	3	2	0	5
CE 213003	Geotechnical Engineering-2	3	1	0	4
CE 213103	Geotechnical Engineering Laboratory-2	0	0	2	1
CE 213601	Seminar	0	0	0	2
	<b>Total</b>	<b>15</b>	<b>6</b>	<b>6</b>	<b>24</b>

I	Course Code	<b>CE 213001</b>			
II	Course Title	<b>Reinforced Concrete Design</b>			
III	Credit Structure	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	2	0	5
IV	Prerequisite(If any for the student )	Structural Analysis, Strength of Materials, Construction Materials			
V	Course Content	<ul style="list-style-type: none"> <li>• <b>Elementary Materials:</b> cement, aggregate, admixture and reinforcement, Strength and durability, shrinkage and creep. Design of concrete mixes, Acceptability criterion, IS Specifications,</li> <li>• <b>Basic design philosophies in reinforced concrete:</b> Objective of structural design, working stress and limit state methods, IS Code of practices and Specifications, Normal distribution curve, concepts of probability and reliability, characteristic strength and characteristics loads, design values, Partial safety factors and factored loads, load combinations, stress-strain relationship for concrete and steel.</li> <li>• <b>Working Stress Method:</b> Basic assumptions, permissible stresses in concrete and steel, design of singly and doubly reinforced rectangular and flanged beams in flexure, theory of flexure, inverted flanged beams, design examples.</li> <li>• <b>Limit State Method:</b> Basic assumptions, Limit state of collapse in flexure, shear and Limit state of serviceability in deflection and cracking, design of singly and doubly reinforced rectangular and T sections for flexure, design of members in shear and bond, design of beam subjected to bending and torsion. Requirements governing reinforcement detailing.</li> <li>• <b>Design of Slabs:</b> Design of one-way and two-way slabs, openings in slabs, Design examples.</li> <li>• <b>Columns and Foundation:</b> Limit state of collapse compression for short and slender column. Members subjected to combined axial and uni-axial as well as biaxial bending. Development of interactive curves and their use in column design. Isolated square and rectangular footings subjected to axial load and moments. Design of combined footing and strap footing.</li> <li>• <b>Design of Staircases:</b> Design of dog legged and open well type staircase using limit state method</li> <li>• <b>Design of Retaining Walls:</b> Classification, Forces on retaining walls, design criteria, stability requirements, Design of cantilever and counter fort type retaining wall using limit state method.</li> </ul>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. Design of Reinforced Concrete Structures,P.Dayaratnam,Oxford &amp; IBH Pub.,N.Delhi.</li> <li>2. Reinforced Concrete-Limit State Design, A.K.Jain, Nem Chand &amp; Bros.,Roorkee.</li> <li>3. Reinforced Concrete, I.C.Syal &amp; A,K,Goel, A.H,Wheeler &amp; Co.Delhi.</li> <li>4. Reinforced Concrfete Design, S.N.Sinha, TMH Pub.,N.Delhi.</li> <li>5. Reinforced Concrete Fundamentals: Ferguson, P. M., Breen, J. E., and Jirsa,</li> </ol>			

		<p>J. O., John Wiley and Sons (1988) 5th Edition.</p> <p>Relevant IS codes and Design Aids, BIS Publications.</p> <ul style="list-style-type: none"> <li>(i) IS 456:2000 Plain and Reinforced concrete, Code of Practice.</li> <li>(ii) IS 10262: 2019 Concrete Mix Proportioning Guidelines (Second Revision )</li> <li>(iii) SP-16(S&amp;T)-1980, 'Design Aids for Reinforced Concrete to IS:456, BIS, N.Delhi.</li> <li>(iv) IS 875: -1987 (Part I to V) Code of Practice For Design Loads (Other Than Earthquake) For Buildings And Structures</li> <li>(v) IS 3370-1976(Part I to IV), Indian Standard Code of Practice for Liquid Retaining Structures.</li> </ul>
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I	Course Code	<b>CE 213002</b>			
II	Course Title	<b>Construction Management and Costing</b>			
III	Credit Structure	<b>L</b>	<b>P</b>	<b>T</b>	<b>C</b>
		3	2	0	5
IV	Prerequisite(If any for the student )				
V	Course Content	<ul style="list-style-type: none"> <li>• <b>CONSTRUCTION PROJECTS:</b> Construction Industry in India, Project Categories, Project Planning &amp; Organization Systems, Heavy Construction Projects, Overview of Building codes, local laws, approvals</li> <li>• <b>Estimation and Costing:</b> Principles of estimation; Quantity estimation of various building units, Principles of general and detailed specifications; Methods of costing; Cost estimating: Material, Labour, Equipment, Cost Optimization</li> <li>• <b>Rate Analysis:</b> General; Factor affecting rate analysis; Importance of rate analysis; Schedule of rate</li> <li>• <b>Construction Management:</b> Construction and its challenges, Role and features of construction management, Factors governing construction managements, Methods for planning of construction activity and its managements: Defining activities and their interdependence, network, time and resource estimations, Project scheduling: bar charts, PERT, CPM, network diagrams</li> <li>• <b>Project management:</b> Quality assurance, claims management, safety; Resource Planning; Resource allocation: Resource smoothing, Resource Levelling.</li> </ul>			
VI	Text/References	<p>Aggarwal A. and A. K. Upadhyay, Civil Estimating, costing and valuation, Kataria &amp; Sons, New Delhi, 1994</p> <p>Birdie G. S., Estimating and Costing, Dhanpat Rai &amp; Sons, Delhi. 1996</p> <p>Dutta B. N., Estimating and Costing, S. Dutta &amp; Co., Lucknow-1, 1995</p> <p>Schexnayder C. J. and R. E. Mayo, Construction Management Fundamentals, McGraw Hill, New Delhi, 2003.</p> <p>Srinath, L.S. PERT and CPM principles and Applications, Third edition, Affiliated east-west press Pvt Ltd, 2001.</p> <p>Berrie D.S. and B.C. Paulson, Professional construction management including C.M., Design construct and general contracting, Third edition, McGraw Hill International edition, 1992.</p> <p>Chitkara, K.K. Construction project management: planning, scheduling and controlling, Tata McGraw-Hill, 2008.</p> <p>Rangwala S.C. Estimating, Costing and Valuation, Charotar Publishing house Pvt. Ltd., 2012</p> <p>Kumar Neeraj Jha. Construction Project Management: Theory and Practice, Pearson Education India, 2011</p>			

I	Course Code	<b>CE 213003</b>			
II	Course Title	<b>Geotechnical Engineering -2</b>			
III	Credit Structure	<b>L</b>	<b>P</b>	<b>T</b>	<b>C</b>
		3	1	0	4
IV	Prerequisite(If any for the student )	Geotechnical Engineering- 1			
V	Course Content	<ul style="list-style-type: none"> <li>• <b>Site investigation:</b> Planning and various stages of subsurface investigation, Methods of exploration, Types of soil samples and samplers, Design features affecting sample disturbance, In- situ tests for determining properties of soil, Geophysical methods of subsurface investigation.</li> <li>• <b>Earth pressure theory:</b> Lateral earth pressure- at rest, active and passive, Rankine's and Coulomb's earth pressure theories, Graphical methods for earth pressure determination.</li> <li>• <b>Stability of slopes:</b> Types of slope, Causes and type of slope failure, Factor of safety, Stability of infinite slopes, Analytical and graphical methods to find stability of finite slope, Stability number.</li> <li>• <b>Bearing capacity of shallow foundation:</b> Basic definitions, Factors influencing bearing capacity, Modes of shear failure, Terzaghi's bearing capacity theory, various equations used to find bearing capacity of soil including IS method, Effect of water table, Field methods of evaluation of bearing capacity, Immediate and consolidation settlement of foundation, Effect of eccentric loading (one- way and two-way), Proportioning isolated footing, Allowable bearing capacity and settlement, Introduction to combined footing</li> <li>• <b>Axially loaded pile foundations:</b> Necessity and classifications of pile foundations, Construction methods of bored and driven piles, Load carrying capacity of single pile in cohesionless and cohesive soil by (a) Static methods, (b) Dynamic methods and (c) Pile load test as per IS: 2911, Ultimate capacity, settlement and efficiency of pile group in cohesionless and cohesive soils, Negative skin friction.</li> </ul>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. B. M. Das, Principles of Foundation Engineering, Cengage Learning.</li> <li>2. Joseph E. Bowles, Foundation Analysis and Design, McGraw Hill International Ed.</li> <li>3. V. N. S. Murty, Soil Mechanics and Foundation Engineering, CRC Press.</li> <li>4. Gopal Ranjan, Basic and Applied Soil Mechanics, New Age Publication.</li> <li>5. M Tomlinson and J Woodward, Pile design and construction practice, Taylor and Francis</li> <li>6. Relevant Indian Standard Codes (IS 2720 Series)</li> </ol>			

I	Course Code	<b>CE 213103</b>			
II	Course Title	<b>Geotechnical Engineering Laboratory-2</b>			
III	Credit Structure	<b>L</b>	<b>P</b>	<b>T</b>	<b>C</b>
		0	0	2	1
IV	Prerequisite(If any for the student )				
V	Course Content	<p><b>Laboratory experiments:</b></p> <ol style="list-style-type: none"> <li>1. Determination of cohesion from unconfined compression test</li> <li>2. Determination of shear parameters from direct shear test</li> <li>3. Determination of shear strength of soft clays from vane shear test</li> <li>4. Determination of shear parameters form unconsolidated undrained triaxial compression test</li> <li>5. Determination of consolidation characteristics of soil specimen by one dimensional consolidation test</li> <li>6. Determination of swelling characteristics by free swell index and swelling pressure test</li> <li>7. Determination of swelling pressure by indirect method (odometer test)</li> <li>8. Determination of California Bearing Ratio (CBR) from CBR test</li> <li>9. Identification of dispersive soil by crumb test</li> </ol>			
VI	Text/References	<ol style="list-style-type: none"> <li>1.Manual of Soil Laboratory Testing (Volume 2) by K. H. Head</li> <li>2.Soil Mechanics Laboratory Testing by B. M. Das</li> <li>3.Relevant Indian Standard Codes (IS 2720 Series)</li> </ol>			

# BACHELOR OF TECHNOLOGY

## Civil Engineering Department

### Semester - V

### Course Scheme

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
HS 213001	Introduction to Economics	3	0	0	3
CE 203001	Transportation Engineering-2	3	1	0	4
CE 203002	Geotechnical Engineering-1	3	1	0	4
CE 203102	Geotechnical Engineering-1 - Lab	0	0	2	1
CE 203003	Hydrology and Hydraulic Structures	3	2	0	5
CE 203004	Structural Analysis	3	2	0	5
	<b>Total</b>	<b>15</b>	<b>6</b>	<b>2</b>	<b>22</b>

**Civil Engineering Department**  
**Semester - V**

I	Course Code	<b>HS 213001</b>			
II	Course Title	<b>Introduction to Economics</b>			
III	Credit Structure	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	0	0	3
IV	Prerequisites (if any)	Nil			
V	Course Coordinator				
VI	Course Contents	<ul style="list-style-type: none"> <li>• <b>Introduction to Economics</b> Introduction to Economics and definition of economics, Branches of Economics, Meaning of Managerial Economics, Nature, and Scope &amp; Objective of Managerial Economics.</li> <li>• <b>Demand and Supply Analysis</b> The demand &amp; Supply Schedule, Demand function and Supply function, Law of Demand &amp; Supply , Determinants of Demand &amp; Supply, Demand and supply curve shift, Equilibrium with supply and demand curve. Effects of a shift in Supply or Demand, Interpreting Changes in Price &amp; Quantity, Types of Elasticity of Demand &amp; Supply, Measurement of Elasticity.</li> <li>• <b>Theory of Production &amp; Cost</b> Basic Concept of production, The Production function, Factors of Production, Total, Average &amp; Marginal product, Short &amp; Long Run production Function, Law of Variable proportion, Law of Return to Scale, Law of diminishing Marginal product, Concept of cost, Total ,Marginal &amp; Average Cost, Short Run &amp; Long Run Cost, Relation Ship Between Marginal &amp; Average cost.</li> <li>• <b>Market Structures</b> Market Structure –I Perfect Competition, Price &amp; output Determination under perfect Competitive Market, Short Run &amp; Long Run Equilibrium, Market Structure-II Monopoly, Definition of Imperfect Competition, Basic Concept of Monopoly, Short &amp; Long run equilibrium Under Monopoly. Market Structure III Monopolistic Competition, Concept of Monopolistic Competition, Features of Monopolistic Competition, Market Structure –IV Oligopoly, Concept of Oligopoly Market, Features of Oligopoly.</li> <li>• <b>Measuring National Output and National Income</b></li> </ul>			

		<p>Structure of Macro Economy, Different sectors of the economy, Circular Flow of Income &amp; Product, Leakages &amp; Injections in the Circular Flow, Concepts relating to National Income and related Aggregates, Methods of calculation of National Income, GDP deflator, CPI and WPI and its impact on business.</p> <ul style="list-style-type: none"> <li>• <b>Unemployment and Inflation</b> Types and causes of unemployment, Measures to solve unemployment problem, Inflation, Meaning and types, Explanation of Inflation- demand pull inflation &amp; cost push inflation, Effects of Inflation on distribution of income &amp; wealth and on output &amp; growth, Methods to control Inflation.</li> <li>• <b>The Balance of Payments and Exchange Rates</b> Balance of Payments, Meaning and Components, Difference between BOP &amp; BOT, Causes of disequilibrium in BOP, Measures to correct disequilibrium in BOP, Exchange Rate Determination, Meaning of Foreign Exchange Rate, Types of Exchange Rate- Fixed &amp; Flexible Exchange Rate System, Purchasing Power Parity Theory.</li> <li>• <b>Time Value of Money and Economic Equivalence</b> Cost- benefit analysis , Project Cash Flows, Initial Project Screening Methods: payback Screening and Discounted Cash Flow Analysis, Variations of Present-Worth Analysis.</li> </ul>
VI	Text/References	<ol style="list-style-type: none"> <li>1. Paul A Samuelson and William D Nordhaus (2013), Economics. McGraw Hill</li> <li>2. Macroeconomics: Dornbusch, Fischer, and Startz (Ninth Edition), 2004. Tata McGraw-Hill</li> <li>3. Macroeconomics: Olivier Blanchard (Fourth Edition), 2007. Pearson Education</li> <li>4. Romer D., 1996, Advanced Macroeconomics, McGraw-Hill International</li> <li>5. William A. McEachern and Simrit Kaur, Micro ECON: A South-Asian Perspective, Cengage Learning</li> <li>6. Vanita Agarwal, Managerial Economics, Pearson</li> <li>7. Managerial Economics Peterson and Lewis Pearson</li> <li>8. Managerial Economics H L Ahuja Sultan Chand</li> <li>9. Managerial Economics P L Mehta Sultan Chand</li> <li>10. Economics for Managers Hirschey Thomson</li> <li>11. Managerial Economics Atmanand Excel Books</li> </ol>

## Civil Engineering Department

### Semester : V

I	Course Code	<b>CE 203001</b>			
II	Course Title	<b>Transportation Engineering-2</b>			
III	Credit Structure	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	1	0	4
	Prerequisite(If any for the student )	Transportation Engineering-1			
V	Course Content	<ul style="list-style-type: none"> <li>• <b>Transportation Planning:</b> Planning Objectives; Planning Process; Transportation surveys; Four stage Travel Demand Modelling: Trip Generation- Factors affecting productions and attractions, Prediction techniques – Regression analysis and Category analysis; Trip Distribution – Predictions Techniques – Growth Factor methods and Synthetic models; Modal Split Analysis – Factors affecting mode choice, Models – Trip End and Trip Interchange, Logit Models; and Route Assignment Analysis – Factors affecting route choice, Shortest path method, Trip Assignment Techniques – All or Nothing and CRT model.</li> <li>• <b>Urban Mass Transit Systems:</b> Introduction to various types of mass transportation systems, Mass transit system characteristics, Terminals and their functions.</li> <li>• <b>Airport Engineering:</b> Air transport- structure and organization, the challenges and the issues, Airport master plan, Aircraft characteristics, Geometric design of airfields, Air Traffic Control.</li> <li>• <b>Railway Engineering:</b> Rail transportation importance, Current scenario of Indian Railways System, Railway track gauges, Elements of Geometric design, Points and Crossings, Railway accidents and Disaster Management.</li> </ul>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. Transportation Engineering and Planning: C.S. Papacostas and P.D. Prevedouros; Prentice Hall India Learning Pvt. Ltd., New Delhi</li> <li>2. Transportation Engineering: Khisty, C.J.and Lall, Kent, B.;Prentice Hall India Learning Pvt. Ltd., New Delhi.</li> <li>3. Modelling Transport (4 Edition), Juan de Dios Ortuzar and Luis G. Willumsen (2011, Wiley).</li> <li>4. Urban Public Transportation –Systems and Technology, Vukan R. Vuchic (2007 Wiley).</li> <li>5. Transportation Engineering: An Introduction (3rd Edition), C. JotinKhisty and B. Kent Lall</li> <li>6. Horonjeff, R. Mickelvey, F.X, Planning &amp; design of airports, Mc Graw Hill, New York, 4th edition.</li> <li>7. Khanna, S.K., Arora, M.G., and S.S. Jain; Airport Planning and Design, Nem Chand &amp; Brothers.</li> <li>8. Saxena S.C. and Arora S.P., Railway Engineering Dhanpat rai Hay, W.W Railway Engineering John Wiley and Sons, New York.</li> </ol>			
VI	Any other Remarks:				

## Civil Engineering Department

### Semester : V

I	Course Code	<b>CE 203002</b>			
II	Course Title	<b>Geotechnical Engineering-1</b>			
III	Credit Structure	L	T	P	C
		3	1	0	4
IV	Prerequisite(If any for the student )				
V	Course Content	<ul style="list-style-type: none"> <li>• <b>Basic Concepts and Classification of Soil:</b> Scope of Soil Mechanics; Origin and formation of soil; Terminology of different types of soils; Soil as three phase system; weight-volume relationships; Particle size analysis and Plasticity characteristics of soil; Clay mineralogy; Sensitivity and thixotropy; Classifications of soils</li> <li>• <b>Compaction:</b> Principle of soil compaction; laboratory compaction; Factors affecting soil compaction; Field compaction</li> <li>• <b>Permeability and Seepage:</b> Permeability of soils; Seepage and flow nets; Effective stress principle; Introduction to liquefaction</li> <li>• <b>Consolidation:</b> Compressibility and consolidation; spring analogy; pre- consolidation pressure; Terzaghi's theory of one dimensional consolidation; time-settlement curve; computation of settlement</li> <li>• <b>Stresses in soil:</b> Computation of stresses in soil using Boussinesq theory, Westergaard theory and Newmark's chart; arching in soils</li> <li>• <b>Shear Strength of Soil:</b> Principle stresses in soil; Graphical method of determination of stresses; Shear strength of soils; Mohr-coulomb failure criteria; Total stress and effective stress analysis; Shear strength testing; Introduction to stress paths</li> </ul>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. Soil Mechanics in Engineering Practice by Karl Terzaghi (Wiley India)</li> <li>2. Textbook of Geotechnical Engineering by B. M. Das (Cengage Learning)</li> <li>3. Basic and Applied Soil Mechanics by G. Ranjan and A. S. R. Rao (New Age International)</li> <li>4. Geotechnical Engineering: principles and Practices by D. P. Koduto (Prentice Hall of India Pvt. Ltd.)</li> <li>5. Geotechnical Engineering: A Practical Problem Solving Approach by N. Sivakugan and B. M. Das (Cengage Learning)</li> <li>6. Recent relevant literature</li> </ol>			

## Civil Engineering Department

### Semester : V

I	Course Code	<b>CE 203102</b>			
II	Course Title	<b>Geotechnical Engineering-1 -Lab</b>			
III	Credit Structure	L	T	P	C
		0	0	2	1
IV	Prerequisite(If any for the student )				
V	Course Content	<p><b>Laboratory experiments:</b></p> <ol style="list-style-type: none"> <li>1. Preparation of soil and determination of moisture content by oven drying method and rapid moisture meter</li> <li>2. Determination of specific gravity of soil by density bottle / Pycnometer</li> <li>3. Visual classification of soil, particle size distribution by sieve analysis</li> <li>4. Particle size distribution by sedimentation analysis (hydrometer method)</li> <li>5. Determination of dry density of soil by core cutter method</li> <li>6. Determination of dry density of soil by sand replacement method</li> <li>7. Determination of Atterberg's limits, i.e. liquid limit, plastic limit and shrinkage limit of soil</li> <li>8. Indian standard light compaction test (Standard Proctor Test)</li> <li>9. Indian standard heavy compaction test (Modified Proctor Test)</li> <li>10. Determination of relative density</li> <li>11. Determination of hydraulic conductivity by constant head permeability test</li> <li>12. Determination of hydraulic conductivity by falling head permeability test</li> </ol>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. Manual of Soil Laboratory Testing (Volume 1 and Volume 2) by K. H. Head</li> <li>2. Soil Mechanics Laboratory Testing by B. M. Das</li> <li>3. Soil Mechanics Lab Manual, 2nd Edition by Michael E. Kalinski</li> <li>4. Relevant Indian Standard Codes (IS 2720 Series).</li> </ol>			

## Civil Engineering Department

### Semester : V

<b>I</b>	Course Code	<b>CE 203003</b>			
<b>II</b>	Course Title	<b>Hydrology and Hydraulic Structures</b>			
<b>III</b>	Credit Structure	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	2	0	5
<b>IV</b>	Prerequisite(If any for the student )	Fluid Mechanics			
<b>V</b>	Course Content	<p><b>Part-I Hydrology:</b></p> <ul style="list-style-type: none"> <li>• <b>Introduction:</b> Definition; Hydrologic cycle; Water Budget Equation; Applications in engineering.</li> <li>• <b>Precipitation:</b> Types of precipitation; Measurement of precipitation; Rain-gauge network and number of raingauges; Estimation of missing data; Data consistency; Mean rainfall and method of determination; Frequency of point rainfall.</li> <li>• <b>Stream flow measurements:</b> Measurement of stage and velocity; Stream flow measurement methods, Stage-discharge relationship, Extrapolation of rating curve.</li> <li>• <b>Hydrographs:</b> Definition, type and components of Hydrographs; Factors affecting Hydrographs; Methods of base-flow separation; Effective rainfall; Unit hydrograph and its derivations for different durations; S-curve.</li> <li>• <b>Flood and Flood Routing:</b> Floods – Introduction; rational method and time of concentration; Runoff coefficient and its calculation; Flood frequency analysis – Gumbel’s method and log Pearson type-III method; Design flood and risk analysis. Flood routing- basic equation of routing; Hydrologic and Hydraulic methods of flood routing.</li> </ul> <p><b>Part-II Hydraulic Structures:</b></p> <ul style="list-style-type: none"> <li>• <b>Reservoirs and planning for dam reservoirs:</b> Types of Reservoirs, Capacity-Elevation and Area- Elevation curves, Storage zones of Reservoir, Designing capacity of reservoir, Reservoir Sedimentation, Losses and Clearance.</li> <li>• <b>Design and construction of Gravity Dams:</b> Forces acting on Gravity dam, Modes of failure and Structural stability of Gravity dams, Stability analysis of gravity dams, Construction of gravity dams.</li> <li>• <b>Spillways, Energy dissipator and Spillway gates:</b> Location of spillway, Design consideration for the main spillway, Straight drop spillway, Ogee spillway, Trough spillway, side channel spillway, shaft spillway, Syphon spillway, Energy dissipation below various types of spillways, Hydraulic jump, its use as energy dissipator and design of stilling basins.</li> <li>• <b>River training works:</b> Introduction and various types of structures adopted for river training works.</li> </ul>			

VI	Text/References	<p><b>Textbooks:</b></p> <ol style="list-style-type: none"> <li>1. Engineering Hydrology, K Subramanya, Tata McGraw Hill.</li> <li>2. Applied Hydrology, VenTe Chow, McGraw Hill.</li> <li>3. Irrigation Engineering and Hydraulic Structures, Santosh Kumar Garg, Khanna Publishers.</li> <li>4. Hydraulic Structures, P. Novak, A.I.B. Moffat, C. Nalluri, R. Narayanan, Taylor and Francis.</li> <li>5. River Behavior Management and Training, Vol. I and Vol. II, Central Board of Irrigation and Power (CBIP)</li> </ol>
VI I	Any other Remarks:	

## Civil Engineering Department

### Semester : V

I	Course Code	<b>CE 203004</b>			
II	Course Title	<b>Structural Analysis</b>			
III	Credit Structure	L	T	P	C
		3	2	0	5
IV	Prerequisite(If any for the student )				
V	Course Content	<p><b>Analysis of determinate structures</b></p> <ul style="list-style-type: none"> <li>• Review of beam deflection theory, Energy methods of deformation: Strain energy, energy relations in structural theory, Virtual work, Reciprocal theorem, Castigliano's theorem,</li> <li>• Three hinged arches: Types of arches, static analysis of arch, symmetric and non-symmetric arches, effect of support at different elevations, Bending moment diagram</li> <li>• Deflection analysis of plane trusses: Force analysis, geometric stability and static determinacy of trusses, analysis of trusses</li> </ul> <p><b>Analysis of indeterminate structures</b></p> <ul style="list-style-type: none"> <li>• Static and kinematic indeterminacy, Method of consistent deformation for fixed beams,</li> <li>• Theorem of Three Moments: Derivation and application of three moment equations</li> <li>• Slope Deflection Method: Introduction, sign convention, derivation of slope deflection equations, analysis of continuous beams, analysis of frames with and without lateral deflection.</li> <li>• Moment Distribution Method: Introduction, development of method, carry-over factor, distribution factor, analysis of continuous beams, analysis of frames with and without sway</li> <li>• Two Hinged Arches: Derivation and application of two hinged arches</li> </ul> <p><b>Cables and suspension bridges</b></p> <p>General cable theorem, Cables under a given system of loading, Anchor cables, Temperature stresses, Stiffening girders</p> <p><b>Rolling loads and influence lines</b></p> <p>Maximum shear force and bending moments at sections under a given system of loading, Influence lines for simple beam reactions, Influence line for shear and moments, Influence lines for truss reactions and member forces</p>			

VI	Text/References	<ol style="list-style-type: none"><li>1. Reddy, C. S., 'Basic structural Analysis', Tata Mcgraw Hill.</li><li>2. Hibbeler, R. C., 'Structural Analysis', Pearson Publications.</li><li>3. Menon, D., 'Structural Analysis', Narosa Publications.</li><li>4. Punmia, B. C., Jain, A., and Jain, A., 'Theory of structures', LaxmiPublications Pvt. Ltd.</li><li>5. Pandit, G. S., Gupta, S. P., and Gupta, R., 'Theory of structures - I andII', Tata Mcgraw Hill.</li></ol>
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# BACHELOR OF TECHNOLOGY

## Civil Engineering Department

### Semester - IV

### Course Scheme

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
MA 192002	Introduction To Numerical Methods	3	1	0	4
CE 192005	Fluid Mechanics (Theory)	3	2	0	5
CE 192105	Fluid Mechanics Lab	0	0	2	1
CE 192006	Strength of Materials	3	2	0	5
CE 192107	Environmental Engineering Laboratory	0	0	2	1
CE 192007	Environmental Engineering (Theory)	3	0	0	3
CE 192009	Transportation Engineering- 1	3	1	0	4
	<b>Total</b>	<b>14</b>	<b>6</b>	<b>6</b>	<b>23</b>

## Civil Engineering Department

### Semester : IV

I	Course Code	<b>MA 192002</b>			
II	Course Title	<b>Introduction To Numerical Methods</b>			
III	Credit Structure	L	T	P	C
		3	1	0	4
IV	Prerequisites	NIL			
V	Course Content	<p>Interpolation by polynomials, divided differences, error of the interpolating polynomial, piecewise linear and cubic spline interpolation, Numerical differentiation, Numerical integration, composite rules, error formulae, Solution of a system of linear equations, Gauss elimination, Gauss Seidel methods, partial pivoting, row-echelon form, LU factorization, Cholesky's method, matrix norms, Solution of non-linear equations, Bisection and Secant methods, Picard iteration, Newton's method, Numerical solution of ordinary differential equations, Euler and Runge-kutta methods, multi-step, predictor-corrector methods, Difference equations, Stability, Finite difference methods, Eigen value problem, Gershgorin's theorem, Power and inverse power methods, QR method, Explore to software packages like R, MATLAB.</p>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. S. D. Conte and Carl de Boor, Elementary Numerical Analysis-Algorithmic Approach, McGraw Hill, 1980.</li> <li>2. C. E. Froberg, Introduction to Numerical Analysis, Addison-Wesley, 1981.</li> <li>3. E. Kreyszig, Advanced Engineering Mathematics, Wiley India.</li> <li>4. K. Atkinson and W. Han, Elementary Numerical Analysis, Wiley India, 2004.</li> <li>5. Ward Cheney &amp; David Kincaid, Numerical Mathematics and Computing, Cengage Learning, India Private Limited.</li> <li>6. Steven C. Chapra &amp; Raymond P. Canale. Numerical Methods for Engineers, McGraw Hill, 2012.</li> </ol>			

## Civil Engineering Department

### Semester : IV

<b>I</b>	Course Code	<b>CE 192005</b>		
<b>II</b>	Course Title	<b>Fluid Mechanics (Theory)</b>		
<b>III</b>	Credit Structure	<b>L</b>	<b>T</b>	<b>P</b>
		3	2	0
<b>IV</b>	Prerequisites	-		
<b>V</b>	Instructor(s)	-		
<b>VI</b>	Course Content	<ol style="list-style-type: none"> <li>1. Properties of Fluids</li> <li>2. Pressure and its measurement</li> <li>3. Hydrostatic forces on surfaces</li> <li>4. Buoyancy and floatation</li> <li>5. Analysis of fluid flow by control volume approach and differential ap-proach</li> <li>6. Kinematics of flow and ideal (potential) flow</li> <li>7. Dynamics of fluid flow</li> <li>8. Orifices and mouthpieces</li> <li>9. Notches and weirs</li> <li>10. Turbulent flow</li> <li>11. Flow through pipes</li> <li>12. Dimensional and model analysis</li> <li>13. Boundary layer flow.</li> </ol>		
<b>VI</b> <b>I</b>	Text/References	<ol style="list-style-type: none"> <li>1. Fluid mechanics and hydraulic machines, R.K. Bansal, LaxmiPublications.</li> <li>2. Fluid Mechanics, R.C. Hibbler, Pearson.</li> <li>3. Fluid Mechanics, Frank M. White, Mc Graw Hill Education.</li> <li>4. Introduction to Fluid Mechanics, Fox and McDonald, John Wiley andSons, Inc.</li> </ol>		

## Civil Engineering Department

### Semester : IV

I	Course Code	<b>CE 192105</b>			
II	Course Title	<b>Fluid Mechanics Lab</b>			
III	Credit Structure	L	T	P	C
		0	0	2	1
IV	Prerequisites	-			
V	Instructor(s)	-			
VI	Course Content	<ol style="list-style-type: none"> <li>1. Verification of Bernoulli's equation for an incompressible fluid flow.</li> <li>2. Determination of coefficient of discharge (<math>C_d</math>) for Venturimeter.</li> <li>3. Determination of coefficient of discharge (<math>C_d</math>) for Orificemeter.</li> <li>4. Determination of coefficient of discharge (<math>C_d</math>) for a Rectangular Notch.</li> <li>5. Determination of coefficient of discharge (<math>C_d</math>) for Triangular notch or V-notch.</li> <li>6. Determination of friction factor of a given pipe of circular cross section.</li> <li>7. Determination of loss of head or energy losses in pipe elements.</li> <li>8. Determination of viscosity of given oils using Stokes law.</li> <li>9. Determination of types of flow by Reynolds's number.</li> <li>10. Determination of coefficient of discharge (<math>C_d</math>), coefficient of velocity (<math>C_v</math>) and coefficient of contraction (<math>C_c</math>) for an orifice and mouthpiece.</li> <li>11. Determination of force exerted on stationary plate by impact of jet.</li> <li>12. Determination of surface profile of free and forced vortex flow.</li> </ol>			
VI I	Text/References	<ol style="list-style-type: none"> <li>1. Fluid mechanics and hydraulic machines, R.K. Bansal, LaxmiPublications.</li> <li>2. Hydraulics and fluid mechanics, P.N. Modi and S.M. Seth, Rajsonspublications pvt. ltd.</li> </ol>			

## Civil Engineering Department

### Semester : IV

I	Course Code	<b>CE 192006</b>			
II	Course Title	<b>Strength of Materials</b>			
III	Credit Structure	L	T	P	C
		3	2	0	5
IV	Prerequisites	-			
V	Course Content	<ul style="list-style-type: none"> <li>• <b>Stresses and Strains</b> Stresses, Strains, Modulus of elasticity (E), Modulus of rigidity (G), Bulk Modulus (K), Yield Stresses, Ultimate Stress, Factor of safety, shear stress, Poisson's ratio. Relationship between E, G and K, bars of varying sections, deformation due to self-weight, composite sections, temperature stress. General equation for transformation of stress, principal planes and principal stresses, maximum shear stress, stress determination using Mohr's circle, Principal stresses in shafts subjected to combined torsion, bending &amp; axial thrust, and concept of equivalent torsional and bending moment.</li> <li>• <b>Shear Force and Bending Moment in Beams</b> Axial force, shear force and bending moment diagrams for statically determinate beams including beams with internal hinges for different types of loading. Relationship between rate of loading, shear force and bending moment.</li> <li>• <b>Theory of Simple Bending and Shear stresses</b> Flexure formula for straight beam, moment of inertia, transfer theorem, polar moment of inertia, simple problems involving application of flexure formula, section modulus, moment of resistance, flitched beams. Beam Deflection – Assumptions and Derivations, Double Integration and Macaulay's method Moment Area Method and Conjugate Beam Method. Distribution of shear stress across plane sections commonly used for structural purposes, shear connectors.</li> <li>• <b>Theory of Simple Torsion</b> Torsion in circular shafts-solid &amp; hollow, stresses in shaft when transmitting power, closed coil helical spring under axial load</li> <li>• <b>Columns and Walls</b> Struts subjected to axial loading, concept of buckling, Euler's formula for struts with different support conditions, limitation, Euler's and Rankine's design formulae. Application to member's subjected to eccentric loads, core of section, problems on chimneys, retaining walls etc. involving lateral loads.</li> <li>• <b>Thin Cylindrical and Spherical Shells</b> Derivation for circumferential and longitudinal stresses for cylindrical and spherical shells under internal pressure and examples.</li> </ul>			

VI	Text/References	<p><b>Recommended Books</b></p> <ol style="list-style-type: none"> <li>1. Strength of Materials: S. Ramamrutham, Dhanpatrai Publishers.</li> <li>2. Mechanics of Materials: Vol-I: S.B. Junnarkar and H.J. Shah, CharotarPublications.</li> <li>3. Strength of Materials: Subramanian, Oxford University Press</li> <li>4. Strength of Materials: S.S. Rattan, Tata Mc-Graw Hill, New Delhi.</li> </ol> <p><b>Reference Books</b></p> <ol style="list-style-type: none"> <li>1. Mechanics of Materials: Timoshenko and Gere, Tata McGraw Hill, NewDelhi.</li> <li>2. Mechanics of Materials: James M. Gere, Books/Cole.</li> <li>3. Mechanics of Materials: E.P. Popov, Prentice Hall India (PHI) Pvt. Ltd.</li> <li>4. Mechanics of Materials: Beer and Johnson, Tata Mc-Graw Hill NewDelhi.</li> </ol>
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## Civil Engineering Department

### Semester : IV

I	Course Code	<b>CE 192107</b>			
II	Course Title	<b>Environmental Engineering Laboratory</b>			
III	Credit Structure	L	T	P	C
		0	0	2	1
IV	Prerequisites	-			
V	Instructor	Dr. Jaidevi Jeyaraman			
VI	Course Content	<ol style="list-style-type: none"> <li>1. Preliminary Examination for water for taste, odor and color</li> <li>2. Examination of water for pH, turbidity, conductivity</li> <li>3. Examination of water for alkalinity</li> <li>4. Determination of sulfates- gravimetric and turbidimetric method</li> <li>5. Determination of total solids (TS), total suspended solids (TSS) and total dissolved solids (TDS) in a water sample.</li> <li>6. Determination of BOD</li> <li>7. Determination of COD</li> <li>8. Determination of free and residual chlorine in water</li> <li>9. Examination of water for Ammonical nitrogen and total Kjeldahl nitrogen</li> <li>10. Microbiological testing of water</li> <li>11. Determination of fluorides in water</li> <li>12. Demonstration of TOC and IC analysers for water and ambient aerosol samples</li> <li>13. Demonstration of Automatic Weather station (AWS).</li> </ol>			
VII	Text/References	<ol style="list-style-type: none"> <li>1. Environmental engineering, HS Peavy, DR Rowe, G Tchobanoglous, McGraw Hill</li> <li>2. Environmental engineering: Water supply engineering, SK Garg, Khanna Publishers</li> </ol>			
VII I	Any other Remarks				

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## Civil Engineering Department

### Semester : IV

I	Course Code	<b>CE 192007</b>			
II	Course Title	<b>Environmental Engineering (Theory)</b>			
III	Credit Structure	L	T	P	C
		3	0	0	3
IV	Prerequisites	-			
V	Instructor	Dr. Jaidevi Jeyaraman			
VI	Course Content	<ul style="list-style-type: none"> <li>• <b>Water treatment:</b> Sources of water, Quality and quantity of water, Water-borne diseases, Drinking water standards, water requirements, water chemistry, basic unit operations and unit processes for water treatment, distribution of water.</li> <li>• <b>Wastewater treatment:</b> Sources of water pollution and their characteristics, Quantity and characteristics of wastewater. Primary, secondary and tertiary treatment of wastewater, sludge disposal, effluent discharge standards.</li> <li>• <b>Air Pollution:</b> Types of pollutants, their sources and impacts, Air quality standards, air pollution meteorology, air pollution control methods.</li> <li>• <b>Municipal Solid Wastes:</b> Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management</li> <li>• <b>Noise Pollution:</b> Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.</li> </ul>			
VII	Text/References	<ol style="list-style-type: none"> <li>1. Environmental engineering, HS Peavy, DR Rowe, G Tchobanoglous, McGraw Hill</li> <li>2. Environmental engineering: Water supply engineering, SK Garg, Khanna Publishers</li> </ol>			
VII I	Any other Remarks				

## Civil Engineering Department

### Semester : IV

<b>I</b>	Course Code	<b>CE 203001</b>			
<b>II</b>	Course Title	<b>Transportation Engineering-1</b>			
<b>III</b>	Credit Structure	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	1	0	4
<b>IV</b>	Course Content	<p><b>Introduction</b></p> <p>Contents &amp; Reference Book for subjects</p> <p>Transport Infrastructure in India – Roads, Railways, Waterways, Airways</p> <p>Major disciplines of Transportation Engg. – Pavement Engg., Traffic, Transport Planning</p> <p>Definitions – Transportation, Transp. Engg., Transportation System</p> <p>Components of Transportation System – Fixed facilities, Flow entities, Control system</p> <p>Classification of Trans. System – Based on area of operation, w.r.t. mode of transport</p> <p>Transportation Problems; Role of trans. In society – Economic, Social, Political, Environmental</p> <p><b>Highway Geometric Design</b></p> <p>Classification of Highways – Urban roads and Non-urban roads</p> <p>Components of H/W cross section; Sight Distance; Design of Horizontal Alignment; Design of Vertical Alignment</p> <p><b>Traffic Engineering</b></p> <p>Definition ; Uninterrupted and Interrupted flow facilities</p> <p>Fundamental parameters of Traffic Flow : Macroscopic : Traffic volume and rate of Flow ; Speed ; Density, Macroscopic Flow Model: Greenshields model and Greenberg Model</p> <p>Fundamental parameters of Traffic Flow : Microscopic : Time headway and Space headway</p> <p>Time space diagram : one vehicle &amp; multiple vehicle</p> <p>Derived relationships from fundamental flow parameters</p> <p>Fundamental flow diagram : Speed Vs density; flow Vs density; speed Vs flow</p> <p><b>Pavement Engineering:</b></p> <p>Pavement materials and characterization, testing and specifications of paving materials, introduction to pavement design, pavement failures.</p>			

V	Text/References	<ol style="list-style-type: none"> <li>1. Kadiyali L. R., "Principles and Practice of Highway Engineering", Khanna Technical Publications, Delhi. 2005</li> <li>2. Khanna S.K., Justo C.E.G., "Highway Engineering", Nem Chand &amp; Bros., Roorkee 1987</li> <li>3. Khisty C J, Lall B. Kent; Transportation Engineering-An Introduction, Prentice-Hall, NJ, 2005.</li> <li>4. Chakroborty P., Das N., Principles of Transportation Engineering, PHI, New Delhi, 2003</li> <li>5. Papacostas C.S. and Prevedouros, P.D., Transportation Engineering &amp; Planning, PHI, New Delhi, 2002</li> <li>6. Vukan R. Vuchic, Urban Public Transportation System &amp; Technology, Prentice Hall, Inc.</li> <li>7. Saxena S.C., Arora K.L., "Railway Engineering", Dhanpat Rai &amp; Sons, New Delhi 1995</li> <li>8. Satish Chandra, Agarwal, M., "Railway Engineering", Oxford University Press, 2007</li> </ol>
VI	Any other Remarks:	

# BACHELOR OF TECHNOLOGY

Civil Engineering Department

Semester - III

Course Scheme

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
HS 192001	Introduction to Sociology	3	0	0	3
MA 192001	Mathematics III (Complex Analysis and Differential Equations II)	4	2	0	6
CE 192001	Engineering Mechanics	3	2	0	5
CE 192002	Surveying And Geoinformatics	3	0	2	4
CE 192003	Construction Materials	3	0	2	4
CE 192004	Building Planning And Drawing	2	0	3	3.5
	<b>Total</b>	<b>18</b>	<b>4</b>	<b>7</b>	<b>25.5</b>

## Civil Engineering Department

### Semester: III

I	Course Code	<b>HS 192001</b>			
II	Course Title	<b>Introduction to Sociology</b>			
III	Credit Structure	L	T	P	C
		3	0	0	3
IV	Prerequisite(If any for the student )	Nil			
V	Course Coordinators	Dr. Shukkoor. T			
VI	Course Content	<p><b>Unit- 1</b>  <b>Sociology:</b>                      Origin and Development; Nature, Scope and Significance; Founders of Sociol-ogy; Sociological Perspectives</p> <p><b>Unit-2</b>  <b>Basic Concepts:</b>                      Society, Community, Social Structure, Status and Role; Culture, Norms and Values, Socialization; social stratification, Groups- Types of group, Social organisations; Social control; Deviance, Social change, Social protests, Social movements</p> <p><b>Unit-3</b>  <b>Social Institutions- Features and Functions:</b>                      Family, Education, Economy, Religion, State</p> <p><b>Unit-4</b>  <b>Social Problems- definition and characteristics:</b>                      Corruption, Unemployment, Poverty</p> <p><b>Unit- 5</b>  <b>Sociology of Science and Technology:</b> Society and Technology: Technol- ogy and Development, The Social Construction of Technology, Technology and Social Relations, Social responsibilities of scientists and technocrats, Gender and Technology</p>			

VII	Text/References	<ol style="list-style-type: none"> <li>1. Giddens, Anthony (2013): Sociology (seventh edition), Cambridge, Polity Press</li> <li>2. Das, Veena (2005): Handbook of Indian Sociology, New Delhi: Oxford University Press</li> <li>3. Harlambos, M. (2014): Sociology: Themes and Perspectives, London: Harper Collins</li> <li>4. MacIver and Page (1974): Society: An Introductory Analysis, New Delhi: Macmillan &amp; Macmillan</li> <li>5. Inkeles, Alex (1987): What is Sociology? New Delhi: Prentice-Hall of India</li> <li>6. Johnson, Harry M. (1995): Sociology: A Systematic Introduction, New Delhi: Allied Publishers</li> <li>7. Ahuja, Ram (2001): Indian Social System, New Delhi: Rawat Publication.</li> <li>8. Ahuja, Ram (2003): Society in India, New Delhi: Rawat Publication.</li> <li>9. Abercrombie, N., Hill, S., Turner, B.S: Dictionary of Sociology (2005): Penguin Reference</li> </ol>
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## Civil Engineering Department

### Semester : III

I	Course Code	<b>MA 192001</b>			
II	Course Title	<b>Mathematics III (Complex Analysis and Differential Equations II)</b>			
III	Credit Structure	L	T	P	C
		4	2	0	6
IV	Prerequisite(If any for the student )	Nil			
V	Course Content	<p>Complex Analysis: Definition and properties of analytic functions; Cauchy-Riemann equations, Harmonic functions; Power series and their properties; Elementary functions; Cauchy's theorem and its applications; Taylor series and Laurent expansions; Residues and the Cauchy residue formula; Evaluation of improper integrals; Conformal mappings.</p> <p>Differential Equations: Laplace transforms, Shifting theorems, Convolution theorem, Review of power series and series solutions of ODEs; Legendre's equation and Legendre polynomials; Regular and irregular singular points, method of Frobenius; Bessel's equation and Bessel's functions; Sturm-Liouville problems; Fourier series; D'Alembert solution to the Wave equation; Classification of linear second order PDE in two variables; Vibration of a circular membrane; Fourier Integrals, Heat equation in the half space</p>			
VI	Text/References	<ol style="list-style-type: none"> <li>1. Kreyszig, E., Advanced Engineering Mathematics, 8th Edition, John Wiley &amp; Sons, 1999.</li> <li>2. Boyce, W.E., and DiPrima, R., Elementary Differential Equations, 8th Edition, John Wiley &amp; Sons, 2005.</li> <li>3. Churchill, R.V., and Brown, J.W., Complex variables and applications, 7th edition, McGraw-Hill, 2003.</li> <li>4. Churchill, R.V., and Brown, J.W., Fourier series and boundary value Problems, 7th Edition, McGraw-Hill, 2006.</li> <li>5. Howie, J.M., Complex Analysis, Springer-Verlag, 2004.</li> <li>6. Ablowitz, M.J., and Fokas, A.S., Complex variables: Introduction and Applications, Cambridge University Press, 1998 (Indian Edition).</li> </ol>			

## Civil Engineering Department

### Semester : III

I	Course Code	<b>CE 192001</b>			
II	Course Title	<b>Engineering Mechanics</b>			
III	Credit Structure	L	T	P	C
		3	2	0	5
IV	Prerequisite(If any for the student )				
V	Course Content	<p><b>Course contents:</b></p> <p><b>Unit-I: Introduction</b> Introduction to engineering mechanics, assumptions, methods of analysis- scalars and vectors, Force system-coplanar and non-coplanar forces, colinear- non-colinear forces, concurrent forces, nonconcurrent forces, moment of force and couple, free body diagram.</p> <p><b>Unit-II: Forces in Engineering Systems</b> Forces in beams: Types of loading-Concentrated load, Uniformly distributed load, Uniformly varying load, Random loads, Types of Support: Free, Fixed, Hinged, Truss Analysis: Assumptions, analysis of forces in truss- method of joints, method of sections, conditions of equilibrium, nature of force system. Friction: Introduction, laws of friction, angle of repose, cone of friction, friction on plane and inclined surfaces, wedge, belt friction, application of friction to engineering problem.</p> <p><b>Unit-III: Centroid, Center of gravity and Moment of Inertia</b> Definitions: Center of gravity, centroid, center of mass, Centroid of standard sections, centroid of composite sections, centroid of wires, moments of inertia, parallel axis theorem, perpendicular axis theorem, radius of gyration, moment of inertia for standard and composite sections.</p> <p><b>Unit-IV: Motion</b> Introduction to dynamics-kinematics and kinetics, <b>Rectilinear motion:</b> Determination of position, distance travelled, uniform motion, effect of increasing/decreasing velocity/acceleration, motion under gravity, relative motion, <b>Curvilinear motion:</b> Resolution of velocity and acceleration, tangential and normal components, radius of curvature, radial and transverse components of acceleration, <b>Projectile Motion:</b> Independence of horizontal and vertical motion, properties of projectile motion, projectile on inclined surfaces.</p> <p><b>Unit-V: Kinetics of Particles</b> <b>D'Alemberts Principle:</b> D'Alemberts principle, D'Alemberts principle in normal and tangential components, motion of connected bodies, simple machines, circular motion, centripetal force, motion of vehicle on a level circular track, motion of vehicle on a banked circular track. <b>Work and Energy:</b> work of force, energy, work of constant force in</p>			

		rectilinear motion, work of force exerted by spring, mechanical efficiency.
VI	Text/References	<p><b>Textbooks:</b></p> <ol style="list-style-type: none"> <li>1. Engineering Mechanics-Statics and Dynamics, S Rajasekaran and G Sankara Subramanian, 3rd Edition, Vikas Publishing House Pvt. Ltd.</li> <li>2. A Textbook of Engineering Mechanics, R K Bansal, Laxmi Publications</li> </ol> <p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. Engineering Mechanics-Statics and Dynamics, Irving Shames and G.Krishna Rao, 4thEdition, Pearson.</li> <li>2. Fundamentals of Engineering Mechanics, Vikas Publishing House PvtLimited, 2009</li> </ol>

## Civil Engineering Department

### Semester : III

<b>I</b>	Course Code	<b>CE 192002</b>			
<b>II</b>	Course Title	<b>Surveying and Geoinformatics</b>			
<b>III</b>	Credit Structure	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	0	2	4
<b>IV</b>	Prerequisite(If any for the student )				
<b>V</b>	Course Content	<p>Introduction to Geoinformatics: Various sub-fields- Surveying, Geodesy, Global Navigation Satellite System (GNSS), Photogrammetry, Remote Sensing, Laser Scanning, Geographical Information System (GIS), Cartography. Three stages: Geospatial Data Collection, Processing, and Analysis/Interpretation.</p> <p>Basic concepts of surveying: Objectives; Basic measurements, control networks, locating topographic details; Units of measurement; Error in measurement and their types, indices of precision, weight, outliers; Error sources, types; accuracy and precision.</p> <p>Chain surveying- linear measurements, tape corrections, obstacles to chaining, Compass surveying basics of compass surveying, local attraction.</p> <p>Levelling-types of levelling operations, methods of calculation of reduced level, contouring, computation of area and volume.</p> <p>Theodolite- Basics, temporary and permanent adjustments, methods of traversing, closing error, computation of latitude and departure.</p> <p>Coordinate systems: Important surfaces in geodesy: earth surface, geoid, MSL, reference ellipsoid; Reference systems: 2D and 3D coordinate systems; map projection, UTM projection</p> <p>Total station surveys: Principles, classification, salient features of total station</p> <p>GPS survey: Principles, errors, DGPS, DOP, GPS survey Methods and plans</p>			

		<p><b>Practical:</b></p> <ol style="list-style-type: none"> <li>1. To understand map numbering system and to study various details on topographic map(s).</li> <li>2. Study of various instrument used in chain and tape surveying and their uses.</li> <li>3. To measure the distance between two points on a level ground using chain and tape.</li> <li>4. To find the bearings of various station points and to calculate the included angles.</li> <li>5. To prepare a map using chain and compass survey.</li> <li>6. Taking the levels of various points with Single setup, booking in a level field book.</li> <li>7. Establish a close traverse using theodolite and adjust closing error.</li> <li>8. Mapping using Total Station. (will span multiple labs)</li> <li>9. Use of GPS in field for mapping. (will span multiple labs)</li> <li>10. Introduction to GIS software.</li> </ol>
VI	Text/References	<ol style="list-style-type: none"> <li>1. Surveying and Levelling, NN Basak, Mc Graw Hill.</li> <li>2. Surveying Vol. 1, S.K. Duggal, Mc. Graw Hill</li> <li>3. Schofield, W., Engineering Surveying, 6e, Butterworth Heinemann, Oxford.</li> <li>4. Anderson, J.M. and Mikhail, E.M., Surveying theory and practice.</li> </ol>
VI I	Any other Remarks:	

## Civil Engineering Department

### Semester : III

I	Course Code	<b>CE 192003</b>			
II	Course Title	<b>Construction Materials</b>			
III	Credit Structure	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	0	2	4
IV	Prerequisite(If any for the student )				
V	Course Content	<p><b>Construction Materials:</b></p> <p><b>Bricks:</b> Classification, Requirement of good bricks, Manufacturing of clay bricks, Sustainable bricks, Tests on bricks: Dimension, Compressive strength, Water absorption, Efflorescence and Warpage</p> <p><b>Cement:</b> Introduction, Portland cement, raw materials, clinker composition, hydration reactions and products, water requirement, types of cement, testing of cement</p> <p><b>Aggregates:</b> Natural stone aggregates, Industrial by products, Properties of aggregates: Particle size distribution, Specific gravity, Crushing strength, Impact strength, Water absorption, Flakiness Index and Elongation Index, Abrasion Resistance, Bulking of sand, Codal guidelines</p> <p><b>Concrete:</b> Introduction, materials of concrete, grades of concrete, water cement ratio, fresh properties of concrete, strength: compressive, flexure and split tension strength, durability, defects in concrete, non-destructive testing, admixtures. Mix design of concrete</p> <p><b>Steel:</b> Types of steel: Reinforcement steel and rolled steel sections, Stress-strain behaviour, Properties of steel: Unit weight, Tensile strength, Modulus of elasticity, Shear modulus, Poisson's ratio, Coefficient of linear thermal expansion; Different shapes and arrangement</p> <p><b>Bitumen:</b> Types, Uses of bituminous material, Properties of bitumen: Penetration test, Ductility test, Softening point test, Viscosity test, Flash point and fire point test, Rheological Properties, Aging of Bitumen</p> <p>Other construction materials: Stone, Timber, Fly ash, Stabilized Mud, Glass, Geosynthetics etc.</p>			

**Laboratory Experiments (As per Indian Standard codes):**

1. Bricks:
  - a. Compressive strength of bricks
  - b. Water absorption of bricks
  - c. Dimensions and efflorescence of bricks
2. Cement:
  - a. Consistency of cement
  - b. Setting times of cement
  - c. Surface area of cement (Blaine's)
  - d. Sieve Analysis
  - e. Strength test on cement
3. Aggregates
  - a. Particle Size Distribution of Coarse and Fine Aggregates
  - b. Water absorption of coarse and fine aggregates
  - c. Elongation and Flakiness index
  - d. Specific gravity of coarse and fine aggregates
  - e. Impact test on aggregates
  - f. Abrasion test on aggregates
2. Concrete
  - a. Slump Cone Test
  - b. Compaction Factor Test
  - c. Flow Test
  - d. Compressive strength
  - e. Split tension strength
  - f. Flexure strength test
3. Steel
  - a. Tensile strength of steel
  - b. Dimension, cross sectional area and unit weight of steel
4. Bitumen
  - a. Penetration test on bitumen
  - b. Ductility test on bitumen
  - c. Softening point test on bitumen
  - d. Viscosity test on bitumen
  - e. Flash point and fire point test on bitumen

VI	Text/References	<ol style="list-style-type: none"> <li>1. Peter A. Claisse, Civil Engineering Materials, Butterworth-Heinemann Publications, Elsevier</li> <li>2. Marios Soutsos and Peter Domone, Construction Materials: Their Nature and Behaviour, CRC Press, Taylor and Francis Group</li> <li>3. Haimei Zhang, Building Materials in Civil Engineering, Woodhead Publishing</li> <li>4. William P. Spence and Eva Kultermann; Construction Materials, Methods and Techniques: Building for a Sustainable Future, Cengage Learning</li> <li>5. S. K Duggal, Building Materials, Taylor and Francis Publishing</li> <li>6. G. C. Sahu and Jena Joypal, Building Materials and Construction, McGraw Hill Publication</li> <li>7. Recent technical literature on related topics</li> </ol>
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## Civil Engineering Department

### Semester : III

I	Course Code	<b>CE 192004</b>			
II	Course Title	<b>Building Planning and Drawing</b>			
III	Credit Structure	L	T	P	C
		2	0	3	3.5
IV	Prerequisite(If any for the student )				
V	Course Content	<p><b>Principles and Codes of Practices for Planning and Designing of Buildings (Residential and Public buildings)</b> - Study of IS-Code of Practice for Architectural and Building Drawings, Principles of planning for residential buildings, Classification of buildings: Residential-Bungalows, Apartments/Flats etc. Public-Education, Health, Offices/Commercial, Hotels, Hostels, Study of building Bye-laws and documents / permissions required from commencement to completion of the building according to National Building Code (N.B.C.) of India and local Development Control (D.C.) rules, Study of sun path diagram, wind rose diagram and sun shading devices, Calculation of setback distances, carpet area, built-up area and floor space index (FSI), Principles of planning for public buildings: i) Building for education: schools, colleges, institutions, libraries etc. ii) Buildings for health: hospitals, primary health centres etc. iii) Office buildings: banks, post offices, commercial complexes etc. iv) Building for public residence: hostels, boarding houses, etc.</p> <p><b>Components and Services of a Building:</b> Staircase (dog legged &amp; open newel in details), Foundations: stepped footing, isolated sloped footing and combined footing, Openings: doors and windows, Types of pitched roof and their suitability (plan and section), Building services: Water supply, sanitary and electrical layouts.</p> <p><b>Perspective Drawing:</b> One-point perspective, Two-point perspective</p> <p><b>Town Planning, Architectural Planning &amp; Built Environment:</b> Objectives and principles (road systems, zoning, green belt etc.), Master plan and slum rehabilitation, Architectural Planning: introduction and principles, Built Environment: introduction and principles.</p> <p><b>Green Buildings:</b> Introduction and overview, Certification methods (LEED and TERI)</p> <p><b>Computer Aided Drawing (CAD):</b> Advantages of CAD, Overview of any one of the CAD software's prevailing in the market (AutoCAD, Revit, 3D Max etc.)</p>			

VI	Text/References	<ol style="list-style-type: none"> <li>1. Building Drawing with an Integrated Approach to Build Environment by M. G. Shah, C. M. Kale, S. Y. Patki (Tata McGraw-Hill Education)</li> <li>2. Civil Engineering Drawing (including Architectural aspect) by M.Chakraborti (Monojit Chakraborti Publications, Kolkata)</li> <li>3. Planning and Designing Buildings by Y.S. Sane (Modern PublicationHouse, Pune)</li> <li>4. Building Drawing and Detailing by B.T.S. Prabhu, K.V. Paul and C.V.Vijayan (SPADES Publication, Calicut)</li> <li>5. Building Planning by Gurucharan Singh (Standard Publishers &amp;Distributors, New Delhi)</li> <li>6. IS 962: 1989 –Code of Practice for Architectural and Building Drawings.</li> <li>7. National Building Code of India –2005 (NBC 2005)</li> </ol>
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