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
	Total	**14**	**6**	**6**	**23**

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<table>
<tr><td>I</td><td>Course Code</td><td colspan="4">MA 192002</td></tr>
<tr><td>II</td><td>Course Title</td><td colspan="4">Introduction To Numerical Methods</td></tr>
<tr><td rowspan="2">III</td><td rowspan="2">Credit Structure</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>IV</td><td>Prerequisites</td><td colspan="4">NIL</td></tr>
<tr><td>V</td><td>Course Content</td><td colspan="4">Interpolation by polynomials, divided differences, error of the interpolating polynomial, piecewise linear and cubic spine interpolation, Numerical differ- entiation, Numerical integration, composite rules, error formulae, Solution of a system of linear equations, Gauss elimination, Gauss Seidel methods, par- tial pivoting, row-echelon form, LU factorization, Cholesky's method, matrix norms, Solution of non-linear equations, Bisection and Secant methods, Pi- card 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.</td></tr>
<tr><td>VI</td><td>Text/References</td><td colspan="4">1. S. D. Conte and Carl de Boor, Elementary Numerical Analysis-Analgorithmic Approach, McGraw Hill, 1980.
2. C. E. Froberg, Introduction to Numerical Analysis, Addison-Wesley,1981.
3. E. Kreyszig, Advanced Engineering Mathematics, Wiley India.
4. K. Atkinson and W. Han, Elementary Numerical Analysis, Wiley India,2004.
5. Ward Cheney & David Kincaid, Numerical Mathematics andComputing, Cengage Learning, India Private Limited.
6. Steven C. Chapra & Raymond P. Canale. Numerical Methods forEngineers, McGraw Hill, 2012.</td></tr>
</table>

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I	Course Code	**CE 192005**			
II	Course Title	**Fluid Mechanics (Theory)**			
III	Credit Structure	**L**	**T**	**P**	**C**
		3	2	0	5
IV	Prerequisites	-			
V	Instructor(s)	-			
VI	Course Content	1. Properties of Fluids 2. Pressure and its measurement 3. Hydrostatic forces on surfaces 4. Buoyancy and floatation 5. Analysis of fluid flow by control volume approach and differential ap-proach 6. Kinematics of flow and ideal (potential) flow 7. Dynamics of fluid flow 8. Orifices and mouthpieces 9. Notches and weirs 10. Turbulent flow 11. Flow through pipes 12. Dimensional and model analysis 13. Boundary layer flow.			
VII	Text/References	1. Fluid mechanics and hydraulic machines, R.K. Bansal, LaxmiPublications. 2. Fluid Mechanics, R.C. Hibbler, Pearson. 3. Fluid Mechanics, Frank M. White, Mc Graw Hill Education. 4. Introduction to Fluid Mechanics, Fox and McDonald, John Wiley andSons, Inc.			

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I	Course Code	**CE 192105**			
II	Course Title	**Fluid Mechanics Lab**			
III	Credit Structure	**L**	**T**	**P**	**C**
		0	0	2	1
IV	Prerequisites	-			
V	Instructor(s)	-			
VI	Course Content	1. Verification of Bernoulli's equation for an incompressible fluid flow. 2. Determination of coefficient of discharge (C_d) for Venturimeter. 3. Determination of coefficient of discharge (C_d) for Orificemeter. 4. Determination of coefficient of discharge (C_d) for a Rectangular Notch. 5. Determination of coefficient of discharge (C_d) for Triangular notch or V-notch. 6. Determination of friction factor of a given pipe of circular cross section. 7. Determination of loss of head or energy losses in pipe elements. 8. Determination of viscosity of given oils using Stokes law. 9. Determination of types of flow by Reynolds's number. 10. Determination of coefficient of discharge (C_d), coefficient of velocity (C_v)and coefficient of contraction (C_c) for an orifice and mouthpiece. 11. Determination of force exerted on stationary plate by impact of jet. 12. Determination of surface profile of free and forced vortex flow.			
VII	Text/References	1. Fluid mechanics and hydraulic machines, R.K. Bansal, LaxmiPublications. 2. Hydraulics and fluid mechanics,P.N. Modi and S.M.Seth, Rajsonspublications pvt. ltd.			

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<table>
<tr><td>I</td><td>Course Code</td><td colspan="4">CE 192006</td></tr>
<tr><td>II</td><td>Course Title</td><td colspan="4">Strength of Materials</td></tr>
<tr><td rowspan="2">III</td><td rowspan="2">Credit Structure</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>2</td><td>0</td><td>5</td></tr>
<tr><td>IV</td><td>Prerequisites</td><td colspan="4">-</td></tr>
<tr><td>V</td><td>Course Content</td><td colspan="4">

Stresses and Strains
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 & axialthrust, and concept of equivalent torsional and bending moment.
Shear Force and Bending Moment in Beams
Axial force, shear force and bending moment diagrams for statically determi- nate beams including beams with internal hinges for different types of loading. Relationship between rate of loading, shear force and bending moment.
Theory of Simple Bending and Shear stresses
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.
Theory of Simple Torsion
Torsion in circular shafts-solid & hallow, stresses in shaft when transmitting power, closed coil helical spring under axial load
Columns and Walls
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.
Thin Cylindrical and Spherical Shells
Derivation for circumferential and longitudinal stresses for cylindrical and spherical shells under internal pressure and examples.

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VI	Text/References	**Recommended Books** 1. Strength of Materials: S. Ramamrutham, Dhanpatrai Publishers. 2. Mechanics of Materials: Vol-I: S.B. Junnarkar and H.J. Shah, CharotarPublications. 3. Strength of Materials: Subramanian, Oxford University Press 4. Strength of Materials: S.S. Rattan, Tata Mc-Graw Hill, New Delhi. **Reference Books** 1. Mechanics of Materials: Timoshenko and Gere, Tata McGraw Hill, NewDelhi. 2. Mechanics of Materials: James M. Gere, Books/Cole. 3. Mechanics of Materials: E.P. Popov, Prentice Hall India (PHI) Pvt. Ltd. 4. Mechanics of Materials: Beer and Johnson, Tata Mc-Graw Hill NewDelhi.

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<table>
<tr><td>I</td><td>Course Code</td><td colspan="4">CE 192107</td></tr>
<tr><td>II</td><td>Course Title</td><td colspan="4">Environmental Engineering Laboratory</td></tr>
<tr><td rowspan="2">III</td><td rowspan="2">Credit Structure</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>IV</td><td>Prerequisites</td><td colspan="4">-</td></tr>
<tr><td>V</td><td>Instructor</td><td colspan="4">Dr. Jaidevi Jeyaraman</td></tr>
<tr><td>VI</td><td>Course Content</td><td colspan="4">1. Preliminary Examination for water for taste, odor and color
2. Examination of water for pH, turbidity, conductivity
3. Examination of water for alkalinity
4. Determination of sulfates- gravimetric and turbidimetric method
5. Determination of total solids (TS), total suspended solids (TSS) and totaldissolved solids (TDS) in a water sample.
6. Determination of BOD
7. Determination of COD
8. Determination of free and residual chlorine in water
9. Examination of water for Ammonical nitrogen and total Kjeldahl nitrogen
10. Microbiological testing of water
11. Determination of fluorides in water
12. Demonstration of TOC and IC analysers for water and ambient aerosolsamples
13. Demonstration of Automatic Weather station (AWS).</td></tr>
<tr><td>VII</td><td>Text/References</td><td colspan="4">1. Environmental engineering, HS Peavy, DR Rowe, G Tchobanoglous,McGraw Hill
2. Environmental engineering: Water supply engineering, SK Garg,Khanna Publishers</td></tr>
<tr><td>VIII</td><td>Any other Remarks</td><td colspan="4"></td></tr>
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I	Course Code	**CE 192007**			
II	Course Title	**Environmental Engineering (Theory)**			
III	Credit Structure	**L**	**T**	**P**	**C**
		3	0	0	3
IV	Prerequisites	-			
V	Instructor	Dr. Jaidevi Jeyaraman			
VI	Course Content	• **Water treatment:** 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. • **Wastewater treatment:** Sources of water pollution and their characteristics, Quantity and characteristics of wastewater. Primary, secondary and tertiary treatment of wastewater, sludge disposal, effluent discharge standards. • **Air Pollution:** Types of pollutants, their sources and impacts, Air quality standards, air pollution meteorology, air pollution control methods. • **Municipal Solid Wastes:** Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management • **Noise Pollution:** Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.			
VII	Text/References	1. Environmental engineering, HS Peavy, DR Rowe, G Tchobanoglous,McGraw Hill 2. Environmental engineering: Water supply engineering, SK Garg,Khanna Publishers			
VIII	Any other Remarks				

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<table>
<tr><td>I</td><td>Course Code</td><td colspan="4">CE 203001</td></tr>
<tr><td>II</td><td>Course Title</td><td colspan="4">Transportation Engineering-1</td></tr>
<tr><td rowspan="2">III</td><td rowspan="2">Credit Structure</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>IV</td><td>Course Content</td><td colspan="4">
Introduction
Contents & Reference Book for subjects
Transport Infrastructure in India – Roads, Railways, Waterways, Airways
Major disciplines of Transportation Engg. – Pavement Engg., Traffic,Transport Planning
Definitions – Transportation, Transp. Engg., Transportation System
Components of Transportation System – Fixed facilities, Flow entities,Control system
Classification of Trans. System – Based on area of operation, w.r.t. modeof transport
Transportation Problems; Role of trans. In society – Economic, Social,Political, Environmental
Highway Geometric Design
Classification of Highways – Urban roads and Non-urban roads
Components of H/W cross section; Sight Distance; Design of HorizontalAlignment; Design of Vertical Alignment
Traffic Engineering
Definition ; Uninterrupted and Interrupted flow facilities
Fundamental parameters of Traffic Flow : Macroscopic : Traffic volume and rate of Flow ; Speed ; Density, Macroscopic Flow Model: Greenshieldsmodel and Greenberg Model
Fundamental parameters of Traffic Flow : Microscopic : Time headway and Space headway
Time space diagram : one vehicle & multiple vehicle
Derived relationships from fundamental flow parameters
Fundamental flow diagram : Speed Vs density; flow Vs density; speed Vs flow
Pavement Engineering:
Pavement materials and characterization, testing and specifications of paving materials, introduction to pavement design, pavement failures.
</td></tr>
</table>

V	**Text/References**	1. Kadiyali L. R., "Principles and Practice of Highway Engineering", Khanna Technical Publications, Delhi. 2005 2. Khanna S.K., Justo C.E.G., "Highway Engineering", Nem Chand & Bros., Roorkee 1987 3. Khisty C J, Lall B. Kent; Transportation Engineering-An Introduction, Prentice-Hall, NJ, 2005. 4. Chakroborty P., Das N., Principles of Transportation Engineering, PHI,New Delhi,2003 5. Papacostas C.S. and Prevedouros, P.D., Transportation Engineering & Planning, PHI, New Delhi, 2002 6. Vukan R. Vuchic, Urban Public Transportation System & Technology, Prentice Hall, Inc. 7. Saxena S.C., Arora K.L., "Railway Engineering", Dhanpat Rai & Sons, New Delhi 1995 8. Satish Chandra, Agarwal, M., "Railway Engineering", Oxford University Press, 2007
VI	**Any other Remarks:**	