| LESSON PLAN OF 3RD SEMESTER CIVIL ENGINEERING(2023-24) | | | |
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| Discipline:<br>**CE** | Semester:<br>3rd/3rd | Name of the Teaching Faculty<br>Swastik Pradhan | |
| Subject:<br>**Structural mechanics** | No. of Days/per week class allotted:<br>05 | Semester From Date: **01/08/2023** To Date: **30/11/2023**<br>No. of Weeks : **18** | |
| **Week** | **Class Day** | **Theory Topics** | Update/comment |
| 1st | 01 | Review Of Basic Concepts | |
| | 02 | Force, Moment, support conditions, Conditions of equilibrium, C.G & MI, Free body diagram | |
| | 03 | Review of CG and MI of different sections | |
| | 04 | Simple And Complex Stress, Strain | |
| | 05 | Introduction to stresses and strains | |
| 2nd | 01 | Plasticity, Compressibility, Hardness, Toughness, Stiffness, Brittleness, Ductility, Malleability, Creep, Fatigue, Tenacity, Durability | |
| | 02 | Longitudinal and Lateral strains, Poisson's Ratio, Volumetric strain, computation of stress, strain, Poisson's ratio, | |
| | 03 | Hooke's law - Elastic Constants, Derivation of relationship between the elastic constants. | |
| | 04 | Application of simple stress and strain in engineering field<br>Behaviour of ductile and brittle materials under direct loads | |
| | 05 | Stress Strain curve of a ductile material | |
| 3rd | 01 | Limit of proportionality, Elastic limit, Yield stress, Ultimate stress, Breaking stress, Percentage elongation, Percentage reduction in area | |
| | 02 | Deformation of prismatic bars due to uniaxial load, Deformation of prismatic bars due to its self weight | |
| | 03 | Complex stress and strain introduction | |
| | 04 | Principal stresses and strains: Occurrence of normal and tangential stresses, | |
| | 05 | Concept of Principal stress and Principal Planes, major and minor principal stresses | |
| 4th | 01 | Mohr's Circle and its application to solve problems of complex stresses | |
| | 02 | Stresses In Beams and Shafts | |

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| | | introduction | |
| | 03 | Bending stress in beams – Theory of simple bending | |
| | 04 | Equation for Flexure– Flexural stress distribution – Curvature of beam | |
| | 05 | Position of N.A. and Centroidal Axis – Flexural rigidity – Significance of Section modulus | |
| 5th | 01 | Shear stresses in beams | |
| | 02 | Shear stress distribution in beams of rectangular, circular and standard sections symmetrical about vertical axis. | |
| | 03 | Stresses in shafts due to torsion | |
| | 04 | Concept of torsion, basic assumptions of pure torsion, | |
| | 05 | torsion of solid and hollow circular sections, polar moment of inertia | |
| 6th | 01 | Torsional shearing stresses, angle of twist, Torsional rigidity, equation of torsion | |
| | 02 | Combined bending and direct stresses: | |
| | 03 | Combination of stresses, Combined direct and bending stresses | |
| | 04 | Maximum and Minimum stresses in Sections | |
| | 05 | Conditions for no tension | |
| 7th | 01 | Limit of eccentricity, Middle third/fourth rule, Core or Kern for square, rectangular and circular sections | |
| | 02 | chimneys, dams and retaining walls | |
| | 03 | Columns and Struts introduction | |
| | 04 | Definition, Short and Long columns, End conditions, Equivalent length / Effective length, Slenderness ratio, | |
| | 05 | Axially loaded short and long column, Euler's theory of long columns, Critical load for Columns with different end conditions | |
| 8th | 01 | Shear Force and Bending Moment introduction | |
| | 02 | Types of Loads: Concentrated (or) Point load, Uniformly Distributed load (UDL) | |
| | 03 | Types of Supports: Simple support, Roller support, Hinged support, Fixed support | |
| | 04 | Types of Reactions: Vertical reaction, Horizontal reaction, Moment reaction, | |
| | 05 | Types of Beams based on support conditions: Calculation of support reactions using equations of static | |

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| | | equilibrium | |
| 9th | 01 | Shear Force and Bending Moment | |
| | 02 | S.F and B.M diagrams for Cantilevers | |
| | 03 | Practice problem | |
| | 04 | Practice problem | |
| | 05 | S.F and B.M diagrams for Simply supported beams | |
| 10th | 01 | Practice problem | |
| | 02 | S.F and B.M diagrams for overhanging beam | |
| | 03 | practice problem | |
| | 04 | Position of maximum BM, Point of contra flexure | |
| | 05 | Relation between intensity of load, S.F and B.M. | |
| 11th | 01 | Slope and Deflection | |
| | 02 | Shape and nature of elastic curve deflection curve | |
| | 03 | Relationship between slope, deflection and curvature | |
| | 04 | Importance of slope and deflection | |
| | 05 | Slope and deflection of cantilever for point load by Double Integration method | |
| 12th | 01 | Slope and deflection of cantilever for udl by Double Integration method | |
| | 02 | Slope and deflection of simply supported beam for point load | |
| | 03 | Slope and deflection of simply supported beam for udl | |
| | 04 | Macaulay method | |
| | 05 | Practice problem | |
| 13th | 01 | Indeterminate Beams | |
| | 02 | Indeterminacy in beams, | |
| | 03 | Principle of consistent deformation and compatibility | |
| | 04 | Analysis of propped cantilever with SF and BM diagrams | |
| | 05 | Analysis of fixed beam with SF and BM diagram | |
| 14th | 01 | Analysis of two span continuous beam with SF and BM | |
| | 02 | Trusses: Introduction | |
| | 03 | Types of trusses | |
| | 04 | statically determinate and indeterminate | |

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| | | trusses | |
| | 05 | Degree of indeterminacy | |
| 15th | 01 | stable and unstable trusses | |
| | 02 | Advantages of trusses. | |
| | 03 | Numerical problem solving | |
| | 04 | Numerical problem solving | |
| | 05 | Previous year questions solving | |
| 16th | 01 | Numerical problem solving | |
| | 02 | Numerical problem solving | |
| | 03 | Previous year questions solving | |
| | 04 | Previous year questions solving | |
| | 05 | Numerical problem solving | |
| 17th | 01 | Numerical problem solving | |
| | 02 | Numerical problem solving | |
| | 03 | Previous year questions solving | |
| | 04 | Previous year questions solving | |
| | 05 | Numerical problem solving | |
| 18th | 01 | DOUBT CLEARING CLASS | |
| | 02 | DOUBT CLEARING CLASS | |
| | 03 | DOUBT CLEARING CLASS | |
| | 04 | DOUBT CLEARING CLASS | |
| | 05 | Numerical problem solving | |