**LESSON PLAN**

**Name of Faculty: Jeevan Kumar**

**Discipline: Mechanical Engg.**

**Semester: 3rd**

**Subject: Strength of Material**

**Lesson Plan Duration : 16 weeks**

**Work load (Lecture /Practical) per week (in hours): Lectures—03, Practical-02**

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| Week |  | Theory | Practical |
| Lecture Day | Topic (Including Assignment/ Test | Practical Day | Topic |
| 1st | 1 | Introduction | 1 | Introduction |
| 2 | Basic concept of load, stress and strain, Tensile, compressive and shear stresses, Linear strain, Lateral strain, Shear strain, Volumetric strain |
| 3 | Concept of Elasticity, Elastic limit and limit of proportionality, Hook’s Law and Elastic Constants |
| 2nd | 4 | Numerical | 2 | Tensile test on bars of Mild steel and Aluminium |
| 5 | Stress-strain curve for ductile and brittle materials, Nominal stress, Yield point, plastic stage, Ultimate stress and breaking stress, Percentage elongation |
| 6 | Proof stress and working stress, factor of safety, poisons ratio and Numerical |
| 3rd | 7 | Thermal stress and strain, Longitudinal and circumferential stresses in seamless thin walled cylindrical shells | 3 | Practical checking and Viva  |
| 8 | Introduction to Principal stresses, Strain Energy, Resilience, proof resilience and modulus of resilience |
| 9 | Strain energy due to direct stresses and Shear Stress and Stresses due to gradual, sudden and falling load and Numerical |
| 4th | 10 | Concept of moment of inertia and second moment of area, Radius of gyration Theorem of perpendicular axis and parallel axis (with derivation) | 4 | Izod test |
| 11 | Second moment of area of common geometrical sections : Rectangle, Triangle |
| 12 | Second moment of area of common geometrical sections : Circle (without derivation) |
| 5th | 13 | Second moment of area of common geometrical sections : Second moment of area for L,T and I section and Section modulus and Numerical | 5 | Practical checking and Viva |
| 14 | Concept of various types of beams and form of loading |
| 15 | Concept of end supports-Roller, hinged and fixed and Concept of bending moment and shearing force |
| 6th | 16 | B.M. and S.F. Diagram for cantilever and B.M. and S.F. Diagram for simply supported beams | 6 | Charpy test |
| 17 | B.M. and S.F. Diagram for simply supported beams with and without overhang subjected to concentrated and U.D.L. |
| 18 | Numerical |
| 7th  | 19 | Concept of Bending stresses | 7 | Practical checking and Viva |
| 20 | Theory of simple bending, Derivation of Bending Equation and Use of the equation  |
| 21 | Concept of moment of resistance |
| 8th  | 22 | Bending stress diagram | 8 | Torsion test |
| 23 | Section modulus for rectangular, circular and symmetrical I section |
| 24 | Calculation of maximum bending stress in beams of rectangular, circular, and T section |
| 9th  | 25 | Concept of column, modes of failure | 9 | Practical checking and Viva |
| 26 | Types of columns, modes of failure of columns |
| 27 | Buckling load, crushing load |
| 10th  | 28 | Slenderness ratio | 10 | To plot a graph between load and extension and to determine the stiffness of a helical spring. |
| 29 | Effective length, End restraints |
| 30 | Factors effecting strength of a column |
| 11th  | 31 | Strength of column by Euler Formula without derivation | 11 | Practical checking and Viva |
| 32 | Rankine Gourdan formula ( without derivation) |
| 33 | Concept of torsion, difference between torque and torsion |
| 12th  | 34 | Derivation of Torsion Equation, use of torsion equation for circular shaft, (solid and hollow) | 12 | Hardness Test |
| 35 | Comparison between solid and hollow shaft with regard to their strength and weight |
| 36 | Power transmitted by shaft and Concept of mean and maximum torque |
| 13th  | 37 | Numerical | 13 | Practical checking and Viva |
| 38 | Numerical |
| 39 | Closed coil helical springs subjected to axial load and calculation of: Stress deformation |
| 14th  | 40 | Stiffness and angle of twist and strain energy | 14 | To plot a graph between load and extension and to determine the stiffness of a helical spring.  |
| 41 | Strain energy and proof resilience |
| 42 | Determination of number of plates of laminated spring (semi elliptical type only) |
| 15th  | 43 | Numerical | 15 | Practical checking and Viva |
| 44 | Numerical |
| 45 | Test |
| 16th  | 46 | Test | 16 | Practical checking and Viva |
| 47 | Test |
| 48 | Test |