



**SNS COLLEGE OF TECHNOLOGY**  
**COIMBATORE-35**  
**DEPARTMENT OF MECHATRONICS**



Staff InCharge : Dr.T.Balasubramani, ASP/MC

Course : **Strength of Materials (ME 217)**

Semester : **III**

Class : **II Year B.E. (Mechatronics)**

Academic Year : **2014-2015** - Odd Semester

***LESSON PLAN***

| Sl.No.                                     | Topic                                     | Method of Instruction | No. of Periods | Book to be referred |
|--------------------------------------------|-------------------------------------------|-----------------------|----------------|---------------------|
| <b>UNIT I</b>                              |                                           |                       |                |                     |
| <b>STRESS STRAIN DEFORMATION OF SOLIDS</b> |                                           |                       |                |                     |
| 1                                          | Rigid and Deformable bodies               | Black board           | 2              | T1, T2, R1          |
| 2                                          | Strength, Stiffness and Stability         | PPT                   | 1              | T2, R4              |
| 3                                          | Stresses; Tensile, Compressive and Shear  | Black board           | 1              | T1                  |
| 4                                          | Deformation of simple and compound bars   | Black board           | 2              | T1, R4              |
| 5                                          | Simple and Compound Bars under axial load | Black board           | 2              | T2, R5              |
| 6                                          | Elastic constants                         | Black board           | 2              | T2, R1              |
| 7                                          | Strain energy and unit strain energy      | Black board           | 1              | T2, R4              |
| 8                                          | Strain energy in uniaxial loads           | Black board           | 1              | T1, T2, R4          |
| 9                                          | Revision & University QP Discussion       |                       | 1              |                     |
| <i>Unit I</i>                              | <i>13</i>                                 |                       |                |                     |
| <b>UNIT II</b>                             |                                           |                       |                |                     |
| <b>SHEAR</b>                               |                                           |                       |                |                     |

|                                                                                                     |                                                           |             |   |            |
|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-------------|---|------------|
| <b>FOR<br/>CE,<br/>BEN<br/>DING<br/>MOM<br/>ENT<br/>AND<br/>THE<br/>ORY<br/>OF<br/>BEN<br/>DING</b> |                                                           |             |   |            |
| 1                                                                                                   | Types of beams: Supports and Loads                        | Black board | 1 | T1, T2, R1 |
| 2                                                                                                   | Shear Force and Bending Moments in Beams                  | Black board | 2 | T2, R4     |
| 3                                                                                                   | SF and BM for Cantilever, SSB and OHB                     | Black board | 3 | T2, R5     |
| 4                                                                                                   | Stresses in beams                                         | Black board | 1 | T1, T2, R4 |
| 5                                                                                                   | Theory of simple bending                                  | PPT         | 1 | T2, R3     |
| 6                                                                                                   | Stress variation along the length and in the beam section | Black board | 1 | T2, R4     |
| 7                                                                                                   | Strain energy in bending                                  | Black board | 1 | T2, R4     |
| 8                                                                                                   | Revision & University QP Discussion                       | Black board | 1 |            |
| <i>Unit II</i>                                                                                      | <i>II</i>                                                 |             |   |            |
| <b>UNIT<br/>III<br/>TOR<br/>SION<br/>AND<br/>SPRI<br/>NGS</b>                                       |                                                           |             |   |            |
| 1                                                                                                   | Analysis of torsion of circular bars                      | Black board | 1 | T1, T2, R1 |
| 2                                                                                                   | Shear stress distribution                                 | PPT         | 1 | R1         |
| 3                                                                                                   | Bars of Solid and hollow circular section                 | Black board | 1 | R2         |
| 4                                                                                                   | Stepped shaft, Twist and torsion stiffness                | Black board | 1 | T1, T2, R1 |
| 5                                                                                                   | Compound shafts - Fixed and simply supported shafts       | Black board | 1 | R1         |

|                                                                                                                                                         |                                                                                        |             |   |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------|---|------------|
| 6                                                                                                                                                       | Application to close-coiled helical springs                                            | Black board | 1 | T2, R5     |
| 7                                                                                                                                                       | Maximum shear stress in spring section including Wahl Factor                           | Black board | 1 | T2, R5     |
| 8                                                                                                                                                       | Design of helical coil springs - stresses in helical coil springs under torsion loads. | Black board | 1 | T1, T2, R5 |
| 9                                                                                                                                                       | Deflection of helical coil springs under axial loads                                   | Black board | 1 | R5         |
| 10                                                                                                                                                      | Design of helical coil springs                                                         | Black board | 1 | T1, T2, R5 |
| 11                                                                                                                                                      | Stresses in helical coil springs under torsion loads                                   | Black board | 1 | T2, R5     |
| 12                                                                                                                                                      | Strain energy in Torsion                                                               | Black board | 1 | T1, T2, R5 |
| 13                                                                                                                                                      | Revision & University QP Discussion                                                    |             | 1 |            |
| <i>Unit III</i>                                                                                                                                         | <i>13</i>                                                                              |             |   |            |
| <b>UNIT IV</b><br><b>DEFL</b><br><b>ECTI</b><br><b>ON</b><br><b>OF</b><br><b>BEA</b><br><b>MS</b><br><b>AND</b><br><b>COL</b><br><b>UMN</b><br><b>S</b> |                                                                                        |             |   |            |
| 1                                                                                                                                                       | Elastic curve of Neutral axis of the beam under normal loads                           | PPT         | 2 | T1, T2, R3 |
| 2                                                                                                                                                       | Evaluation of beam deflection and slope: Double integration method                     | Black board | 2 | T1, T2, R4 |
| 3                                                                                                                                                       | Area moment theorems for computation of slopes and deflections in beams                | Black board | 2 | T2, R4     |
| 4                                                                                                                                                       | Macaulay Method, Moment-area Method                                                    | Black board | 2 | T2, R3     |
| 5                                                                                                                                                       | Conjugate beam method                                                                  | Black board | 2 | T1, T2, R5 |
| 6                                                                                                                                                       | Columns - End conditions - Equivalent length of a column - Euler equation              | Black board | 2 | T1, T2, R4 |

|                                                          |                                                          |             |   |            |
|----------------------------------------------------------|----------------------------------------------------------|-------------|---|------------|
| 7                                                        | Slenderness ratio - Rankine formula for columns          | Black board | 2 | T1, T2 R3  |
| 8                                                        | Revision & University QP Discussion                      |             | 1 |            |
| <i>Unit IV</i>                                           | 15                                                       |             |   |            |
| <b>UNIT V<br/>ANALYSIS OF STRESSES IN TWO DIMENSIONS</b> |                                                          |             |   |            |
| 1                                                        | Biaxial state of stresses                                | PPT         | 2 | T1, T2, R1 |
| 2                                                        | Thin cylindrical and spherical shells                    | Black board | 2 | T2, R3     |
| 3                                                        | Deformation in thin cylindrical and spherical shells     | Black board | 2 | T2, R3     |
| 4                                                        | Biaxial stresses at a point                              | Black board | 1 | T2, R3     |
| 5                                                        | Stresses on inclined plane                               | Black board | 1 | T1, T2, R4 |
| 6                                                        | Principal planes and stresses                            | Black board | 2 | T1, T2 R3  |
| 7                                                        | Mohr's circle for biaxial stresses, Maximum shear stress | Black board | 2 | T2, T3, R4 |
| 8                                                        | Revision & University QP Discussion                      |             | 1 |            |
| <i>Unit V</i>                                            | 13                                                       |             |   |            |

**Total Hours : 60[Lecture]+5[Revision]=65**

**TEXT BOOKS:**

- T1 Popov E.P, "Engineering Mechanics of Solids", Prentice-Hall of India, New Delhi,1997.  
(Unit I, II, III, IV,V)  
T2 R.K.Rajput, "Strength of Materials", S.Chand and Company Ltd, New Delhi, 2007.  
(Unit I, II, III, IV,V)

**REFERENCES:**

- R1 R.S.Khurmi, "Strength of Materials", S.Chand and Company Ltd, New Delhi, 2006.  
(Unit I, II, III,V)  
R2 Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi,1981.  
(Unit I,II, III)  
R3 Ryder G.H, "Strength of Materials, Macmillan India Ltd"., Third Edition, 2002  
(Unit I, II, III, IV,V)  
R4 Ray Hulse, Keith Sherwin & Jack Cain, "Solid Mechanics", Palgrave ANE Books,2004.

(Unit I, II,V)  
R5 Singh D.K “Mechanics of Solids” Pearson Education, 2002. (Unit I, II, III, IV,V)

**Staff In Charge**

**HOD**

**Principal**