# EXTENDED LECTURE OUTLINE

**SWE6 311** **Strength of Materials** **(1+1)**

**Syllabus:**

Slope and deflection of beams using integration techniques, moment area theorems and conjugate beam method. Columns and Struts. Riveted and welded connections. Stability of masonry dams. Analysis of statically intermediate beams. Propped beams. Fixed and continuous beam analysis using superposition, three moment equation and moment distribution methods.

**Extended Lecture Theory:**

1 Introduction – Stresses, Tensile, Compressive and Shear- Strains, Units- Elastic Curve Elastic Limit – Poisons Ratio. Elastic Constants- Young's Modulus (E), Bulk Modulus (K) and Shear Modulus (G) – Relation between them

2 Stresses in uniformly tapered circular sections- Stresses in bars of composite sections. Thermal Stresses and Strains in simple bars and composite bars

3 Methods of finding out slopes & deflections of beams, Double integration method only shear force and bending moment diagrams

4 Slope and Deflection equations of a simply supported beam with a central point load, simply supported beam with eccentric point load

5 Simply supported beam with a uniformly distributed load

6 Columns and struts, Euler's column theory. Assumptions of Euler's column theory, buckling load- derivations for buckling load of a column with one end fixed other free, with one end fixed and other hinged

7 Expression for buckling load of a column with both ends hinged- with both ends fixed. Types of end conditions of columns; both ends hinged, both ends fixed, one end fixed and other is hinged & one end fixed and another end is free.

8 Types of end conditions of columns; both ends hinged, both ends fixed, one end fixed and other is hinged & one end fixed and another end is free. Limitations of Euler's formula Rankine's formula for columns

9 Riveted joints, types of joints- Design of riveted joints, eccentric riveted connections, strength of a rivet and riveted joint-efficiency of a riveted joint.

10 Welded joints, types of welded joints and Strength of welded joints theory only, technical terms.

11 Design of welded joints, eccentric welded joints.

12 Propped cantilever and beams – Fixed and continuous beams-Deflection and Slope equations
13 Dams, forces acting, stressed at the base width of dams

14 Stability of dams, design of base width of dams

15 Super position theorem- Claypeyron's theorem of three moments. Application of Clayperon's theorem of three moments.

16 Moment distribution methods- Analysis of statistically indeterminate beams

TEXT BOOKS:

1. Bansal, R.K. (1992). Engineering Mechanics and Strength of materials. Laxmi Publications, New Delhi. 2. Gurcharan Singh. (1986). Theory and Design of R.C.C. Structures. Standard Publishers and Distributors, New Delhi.

3. Junnarkar, S.B. (1995). Mechanics of structures (Vol. I and II). Charotar Pub. House, Anand.

4. Khurmi, R.S. (1996) Strength of Materials. S. Chand and Company Limited, New Delhi.

5. Kumar, K. L. (2003). Engineering Mechanics. Tata Mc Graw Hill Publishing Company, New Delhi.

6. Punmia, B.C., Ashok Kumar Jain and Arun Kumar Jain. (1994). Reinforced Concrete Structures (Vol. I). Laxmi Publications, New Delhi.

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1. Ramamrutham, S. and Narayan, R. (1995). Design of Steel Structures. Dhanpat Rai and Sons, Delhi.

2. Ramamrutham. S. (1984). Engineering Mechanics and strength of Materials. Dhanpat Rai and Sons, Nai Sarak, New Delhi.

3. Ramamrutham. S. and Narayan. R. (1997). Strength of Materials. Dhanpat Rai and Sons, Nai Sarak, New Delhi.

4. Sushil Kumar. (1991). Treasure of R. C. C. Design. Standard Book House, Delhi.