[03 – 3111]

III/IV B.E. DEGREE EXAMINATION

First semester

Mechanical Engineering

MECHANICS OF SOLIDS – II

(w.e.f. admitted batch of 2006–2007)

Time : Three hours   Maximum : 70 marks

Question No. 1 is compulsory.

Answer any FOUR questions.

All questions carry equal marks.

1.   (a)   List out the disadvantages of built in beams.

     (b)   Differentiate strut and column.

     (c)   State Castigliano's second theorem

     (d)   Draw Lame line for the case of internal pressure of thick cylinder.

     (e)   Distinguish between cylindrical shell and spherical shell.

     (f)   Define circumferential stress and longitudinal stress.

     (g)   Explain inelastic column buckling.

2. Find the support moments for the continuous beam having an overhang as shown in figure, if the moment of inertia of AB = 1.51 and of BC and CD = 1. Sketch the B.M. and S,F.D.
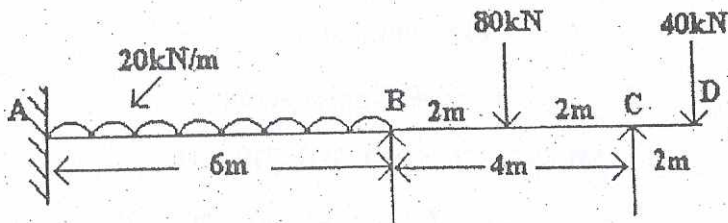
3. (a) Explain how Rankin-Gordon formula is used to calculate the intensity of stress in short, intermediate and long columns.

   (b) Find an expression for crippling load for a long column when one end of the column is fixed and other end is hinged.

4. • Derive the expression for the thickness of disc of uniform strength in terms of radius r.

5. A curved beam of rectangular cross-section of width 20 mm and depth 40 mm is subjected to pure pending moment of +600 N-m. The beam is curved in a plane parallel depth. The mean radius of curvature is 50 mm. Plot the variation of stresses across the section.

6. Find the fixed end moments for a fixed beam of span 6 m subjected to a concentrated clockwise moment of 10 kNm at 2.5 m from the left end.

7. Explain :
   (a) Effect of Sinking in Fixed Beams
   (b) Castigliano's First theorem with applications of Simple Beams.

8. A thick cylinder having internal radius 200mm and external radius 300mm is subjected to 4N/mm². Find the internal pressure that can be applied if the max. Permissible stress is 15N/mm². Find also the change in thickness of the cylinder. Take $E = 2006N/m^2$ and $1/m = 0.3$.