Register number									

45

B.E DEGREE EXAMINATION, APRIL 2011
(Regulation 2004)

Fourth Semester Civil Engineering

CE 281 STRENGTH OF MATERIALS

Time: Three hours Max Marks: 100

Answer ALL questions

Part-A (10x2=20 marks)

1. State Engessor's theorems.
2. Explain strain energy with a stress-strain curve.
3. Write down the three moment equations for a fixed beam carrying an UDL of 2kN/m over the entire span. Span = 4m.
4. What are the methods of analysis for indeterminate beams?
5. Explain the failure of long columns subjected to axial compression.
6. A column of rectangular cross section 200mm x 400mm is hinged at both the ends. What is the buckling load if E=200kN/m^2 and L=5m.
7. What is deviatric component of a stress tensor?
8. State principal strain energy theory of failure.
9. What is shear center?
10. Define fatigue.

Part-B (5x16=80 marks)

11. Find the slope at the ends and maximum deflection of a simply supported beam of 8m span carrying an UDL of 4kN/m over the entire span. EI=40000 kNm^2. Use energy principles.

12a. Draw the BMD and SFD for the beam given in fig Q 12a.

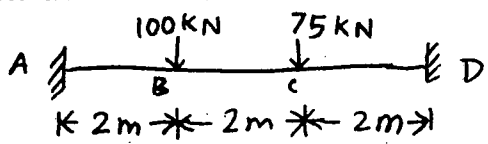
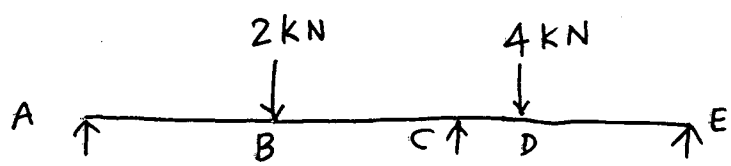


Fig Q12a

(OR)

12.b Draw the BMD and SFD for the beam given in fig Q 12b.



AB = 1.8m; BC = 1.8m; CD = 0.6m; DE = 1.8m

Fig Q 12b

13.a. Calculate the maximum value of the slenderness ratio of a mild steel column for which Euler's formula is valid. Take σ_c =330MN/m^2 and E= 210GN/m^2.

(OR)

13.b From the following data ,determine thickness of cast iron column:
Length of column = 6m,
External diameter=200mm, Load=500kN, Factor of safety=6
Assume fixed ends:
Assume ultimate compressive stress and constant for hinged ends as 570MN/m^2 and 1/1600 respectively.

14a. The state of stress at a point is given by the tensor below

$$\begin{bmatrix} 8 & 5 & 9 \\ 5 & 6 & 4 \\ 9 & 4 & 5 \end{bmatrix} \text{ MPa}$$

Determine the principal stresses.

(OR)

14.b A shaft is subjected to a maximum torque of 10kNm and a maximum bending moment of 7.5kNm at a particular section .If the allowable equivalent stress in simple tension is 160MN/m^2,find the diameter of the shaft according to the maximum shear stress theory.

15a.A beam of T-section (Flange: 100mmx20mm, Web: 150mmx10mm) is 2.5m in length and is simply supported at the ends. It carries a load of 3.2kN inclined at 20^o to the vertical and passing through the centroid of the section.

(OR)

15.b Find the centroidal principal moments of inertia of an equal angle section 300mm x 300mm x 20mm.

----------x----------