Register Number | | | | | | | |

SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act,1956)

Course & Branch :B.Arch - ARCH
Title of the Paper :Applied Mechanics — Max. Marks:80
Sub. Code :621204 (2006-07-08-09) — Time : 3 Hours
Date :09/12/2011 — Session :AN

PART - A (8 x 4 = 32)

Answer ALL the Questions

1. Draw stress-strain curve for a typical structural steel and mark all important points on it. Also explain why the breaking stress is less than the ultimate stress?

2. Explain the procedure to analyse the varying sections.

3. Define radius of gyration? Write the formula for calculating radius of gyration of a circular section?

4. Derive the formula for calculating moment of inertia for a Circle?

5. List down the different types of reaction at the supports along with a neat sketch

6. Draw the shear force and bending moment diagram of a cantilever beam of span 2m with uniformly distributed load (UDL) of 5kN/m over the entire span.

7. What are the conditions to be satisfied to check the stability of a masonry structure?

8. What are the effects of loading a column eccentrically?

PART – B (4 x 12 = 48)

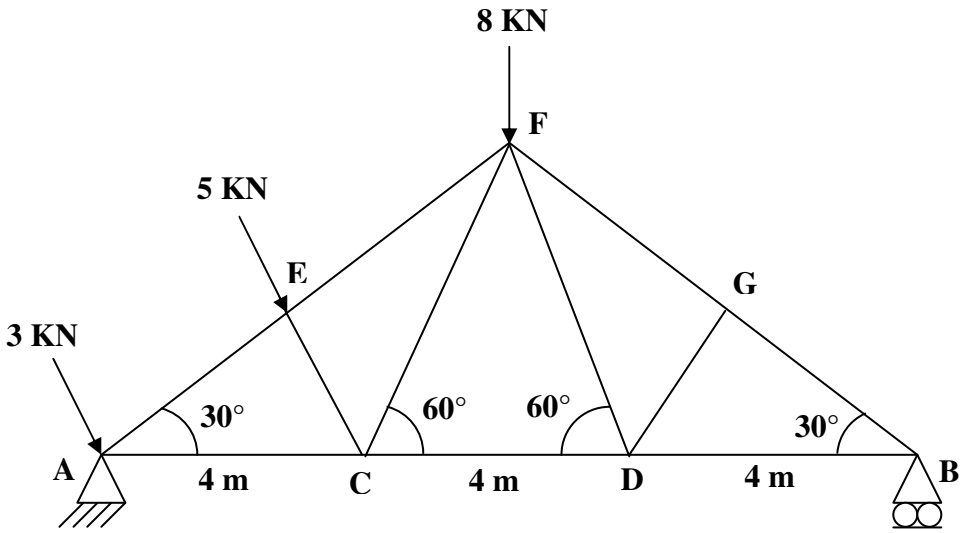
Answer All the Questions

9. A reinforced beam 300mm x 300 mm is reinforced with 8 steel rods of 20 mm diameter. The column carries an axial load of 400

kN. If the modulus of elasticity of steel is 18 times that of concrete, find the stresses in concrete and steel. Take E = 2 x $10^{\%}$ N/mm^2.

(or)

10. Analyse the truss shown in the figure using the method of joints.



11. A steel rod of 25 mm diameter is tested in a and the following observations are made: Gauge length = 200 mm Elongation under the load of 70 KN = 0.22 mm and Load at yield point = 85 KN Ultimate load = 100 KN Breaking load = 90 KN Final length after failure = 240 mm Diameter of neck = 16 mm Determine:
(a) Young's modulus
(b) Yield stress, ultimate stress and breaking stress
(c) Percentage elongation
(d) Percentage reduction in area

(or)

12. Find the moment of inertia about the horizontal and vertical centroidal axis of an I – section with Top flange 80mm × 20mm, Web 20mm × 100mm, Bottom Flange 120mm × 10mm respectively. Also find the radii of Gyration.

13. Find the Polar moment of Inertia about the X and Y axes through its centroid with the following data:

Top Flange = 150 mm x 10 mm
Web Size = 20mm x 200mm
Bottom Flange = 100 mm x 10mm.

(or)

14. A horizontal beam 10m span is carrying a uniformly distributed load of 10kN/m over its entire span. The beam is supported on two supports which are 6m apart. The left support is at a distance of 2m from one of its free end. The beam carries a point load of 40kN at its free end at the right. Draw the loading diagram and find the reaction at its supports.

15. A short column of dimension 300mm × 300mm is subjected to a load of 100KN, acting along the diagonal at a distance of 50mm from the centre. Find the stress intensity at the four corners of the section.

(or)

16. The cross section of a masonry pier is a hollow rectangle, the dimension of the external and internal rectangle being 120cm×80cm and 90cm×50cm respectively. A load of 200kN in the vertical plane bisecting the 120cm width of the pier is transmitted at an eccentricity of 10cm from the geometric axis of the section. Calculate the maximum and minimum normal stress intensities induced in the section.