

THIRD SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/
TECHNOLOGY-OCTOBER 2011
THEORY OF STRUCTURES-1
(Common to CE,AR,QS,EN & WR)

Time :3 hours

Max. Marks:100

PART-A

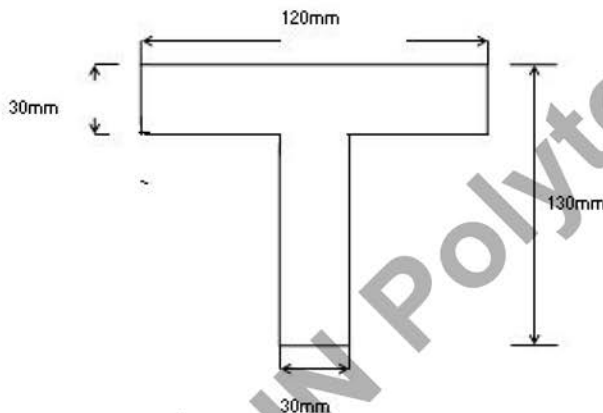
(Answer all the questions in one or two sentences.Each question carries 2 marks)

- I
1. Differentiate between centre of gravity and centroid
 2. Define- proof resilience
 3. Sketch the stress strain curve for mild steel in tension test and mark the salient points
 4. What do you mean by shear force on beams
 5. Express the term equivalent length of a column
- (5x2=10 marks)

PART-B

(Answer any five questions. Each question carries 6 marks)

- II . 1. Determine the centre of gravity of a T section of 120 mm x 130 mm x 30 mm as shown in figure



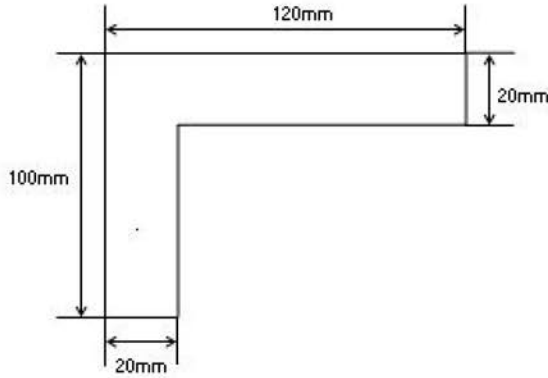
2. Find the support reactions of the simply supported beam of span 6m subjected to a Point load of 10 KN at 2 m from left support and U.D.L. of 5 KN/m for a length 3 m from right support
3. Mention the different elastic moduli
4. Draw the SFD&BMD of the cantilever beam of span 'l' subjected to a u.d.l. of w/ unit length over the entire span
5. Find the power transmitted by a circular shaft of 50 mm diameter at 120 rpm. The maximum stress in the shaft is not to exceed 60 N/mm^2
6. A steam boiler of 800 mm diameter is made up of 10 mm thick plates. If the boiler is subjected to an internal pressure of 2.5 Mpa, find the circumferential & longitudinal stresses induced in the boiler plates
7. Write the Euler's formula for columns at different end conditions (5x6=30 marks)

PART C

UNIT-1

III 1 .Find the moment of inertia of the L section given below about the horizontal and vertical axis passing through it's centre of gravity

8



2.A body of weight 500 N is pulled upon an inclined plane by a force of 350N.The inclination of plane is 30° to the horizontal and the force is applied parallel to the plane .Determine the coefficient of friction

7

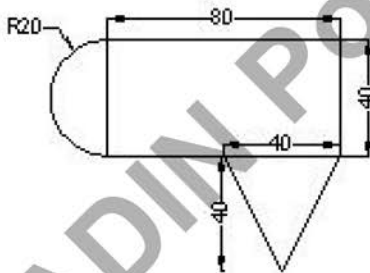
OR

1V) 1. Write short notes on

- 1 Angle of friction and Angle of repose
- 2 Limiting friction and coefficient of friction

6

2 Determine the centre of gravity of the lamina as shown in figure



9

UNIT-2

V .1.A load of 270 KN is carried out by a short concrete column 250x250 mm in size.The column is reinforced with 8 bars of 16 mm diameter. Find the stresses in steel and concrete,if the modulus of elasticity for the steel is 18 times that of concrete

8

2. A steel rod is 2 m long and 50 mm in diameter. An axial pull of 100KN is suddenly applied to the rod .Calculate the instantaneous stress induced and also instantaneous elongation produced in the rod .Take $E=200GN/m^2$

7

OR

- V1 .1. Discuss any six mechanical properties of material 6
2. A gun metal rod 20mm diameter screwed at the ends passes through a steel tube 25 mm and 30 mm internal and external diameters respectively. The nuts of the rod are screwed tightly home on the ends of the tube. Find the intensity of stresses in each metal, when common temperature rises by 200°F. Take the coefficient of expansion for steel is $6 \times 10^{-6}/^{\circ}\text{F}$. Coefficient of expansion for gun metal is $10 \times 10^{-6}/^{\circ}\text{F}$. Modulus of elasticity for steel is 200 Gpa and modulus of elasticity for gun metal is 100Gpa. 9

UNIT-3

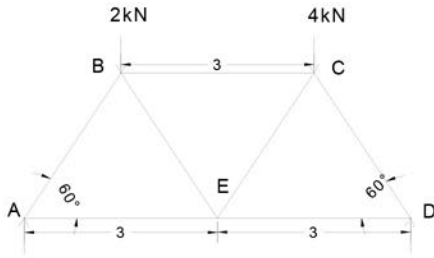
- V11.1 Derive the torsion formula for a solid circular shaft . 10
2. A simply supported beam AB of 6m carries a uniformly distributed load of 4kN/m over the entire span. Draw the SF and BM diagram for the beam . 5
- OR
- V111. A beam 7m long rests on supports 4.5 m apart. The right end is overhanging from its support by 2.5 m. The beam carries a UDL of 3kN/m between the supports and the point loads 6kN, 3kN and 2kN at 1.5m, 3.0m and 7m respectively from left support. Draw the SF and BM diagram of the beam. Calculate the maximum bending moment values and locate the point of contraflexure . 15

UNIT-4

- 1X 1. A steam boiler of 800 mm diameter is made up of 10mm thick plate. If the boiler is subjected to an internal pressure of 2.5MPa. Determine the change in diameter and length. Assume $1/m = 0.3$ and Young's modulus = $2 \times 10^5 \text{ N/mm}^2$. 7
2. A 1.5 m long C.I. column has a circular cross section of 50 mm diameter. One end of column is fixed and the other is free. Taking the factor of safety as 3, calculate the load using Rankine's formula. Take yield stress 560 N/mm^2 and $a = 1/1600$ 8 safe

OR

X Find the forces in all the members of the truss as shown in figure .Measurments are given in 'm'



MADIN Polytechnic College