R – 643

Seat No.	848

Total No. of Pages : 3

S.E. (Civil) (Semester - III) Examination, December - 2014
STRENGTH OF MATERIALS -I (Revised)
Sub. Code : 63340

Day and Date : Monday, 15 - 12 - 2014 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of electronic calculator is permitted.**
4) **Assume suitable data if necessary and mention it clearly.**

SECTION - I

Q1) Solve any **two** **[2 × 10 = 20]**

a) A rigid bar AB is suspended by two rods and supports load of 600 kN as shown in fig 1. Determine the position of the load so that the rod AB remains horizontal after deformation. Take $E_s = 200$ kN/mm² and $E_c = 110$ kN/mm².

b) A thin cylinder of 600 mm dia. is subjected to internal pressure of 3 MPa if the permissible stress is not to exceed 120 MPa determine the wall thickness with factor of safety = 2. What will be the longitudinal stress then?

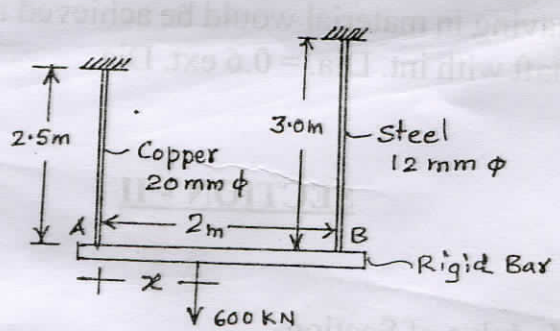

FIG. 1 Q. 1(b)

c) Derive the relationship between E and G.

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Q2) a) Give the procedure to analyze the temperature stresses in composite materials with different coef. of expansions. **[5]**

b) Draw S.F. and B.M. diagrams for the beam shown in fig.2 Clearly show the values at distinct points. **[10]**

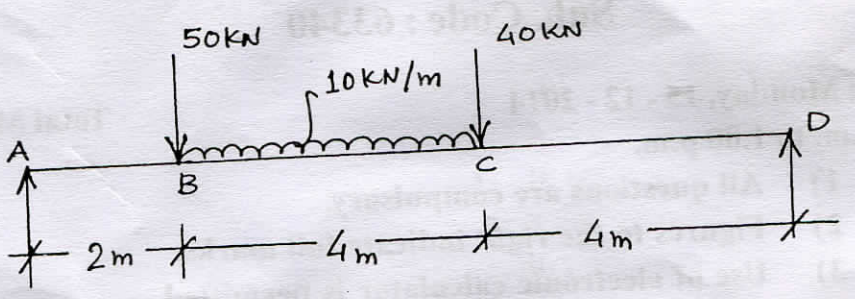


FIG 2 Q. 2(b)

Q3) a) Derive the expressions for circumferential and longitudinal stresses in thin cylinder subjected to internal pressure. **[6]**

OR

Derive the expression for power transmitted by the shaft subjected to torque 'T' and rotating at 'N' r.p.m.

b) A solid circular shaft is to transmit 300 kW at 100 r.p.m. if the max. Shear stress is not to exceed 80 MPa, find the diameter of the shaft. What % saving in material would be achieved if this shaft is replaced by hollow shaft with int. Dia. = 0.6 ext. Dia. **[9]**

SECTION - II

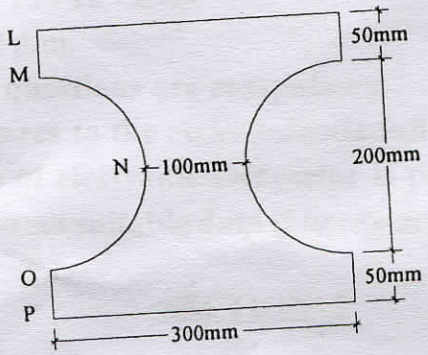
Q4) a) Define Modulus of Section. **[3]**

b) A steel rule having a cross section 1 mm × 40 mm and a length $l = 400$ mm is bent by couples at the ends into a circular arc of 60°. Determine the maximum bending stress and deflection . $E = 200$ kN/mm^2. **[13]**

Q5) A T - section having flange 150 mm × 10 mm and web 10 mm × 90 mm. The member is used as a simply supported beam of span 1.5 m. calculate uniformly distributed load which can be applied over the entire span such that maximum shearing stress induced in the cross section is not to exceed 3 MN/m^2. **[17]**

OR

A steel section shown in figure is subjected to a shear force of 200 kN. Determine the shear stress at *L, M, N, O* and *P*. Hence sketch the shear stress distribution diagram.



Q6) a) Write note on proof resilience and modulus of resilience. **[4]**

b) A cantilever of span *L* carries a concentrated load P at the free end. Find the deflection under the load by strain energy method. **[13]**

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