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SE-6167

B. E. II (Sem. III) (E.C. & Comp.) Examination

April / May – 2011

Strength of Materials (AM 305 EC/CO)

Time : **2** Hours] [Total Marks : **75**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. II (SEM. III) (E.C. & COMP.)**

Name of the Subject :

☛ **Strength of Materials (AM 305 EC/CO)**

☛Subject Code No. : **6 1 6 7** ☛Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Programmable calculator is not permitted.

(3) Figures to the right indicate full marks.

(4) Assume suitable data if required and mention it clearly.

1 (a) Complete the following with proper words / expression : 8

(i) The thermal stress developed in a material is _____ proportional to the change in temperature.

(ii) The materials which have same elastic properties in all directions are called _____,

(iii) The torsional rigidity of a circular shaft is equal to _____.

(iv) Factor of safety is defined as the ratio of _____.

(v) When a solid shaft is subjected to torsion, the shear stress induced in the shaft at its centre is _____.

(vi) Modulus of elasticity is the ratio of _____.

(vii) Cast iron is more _____ than mild steel.

(viii) Limit within which Hook's law holds good is known as _____.

(b) Attempt any two :

(i) Derive the expression for elongation of a tapered circular bar of length L and diameters D and d under axial pull P. Take modulus of elasticity as E. 8

(ii) Derive the relation between modulus of elasticity, modulus of rigidity and Poisson's ratio. 8

(iii) For a member ABC as shown in figure find the diameter of portion BC if the total deformation of the member is 3 mm. Diameter of AB portion is 30 mm. Take E = 200 GPa. 8

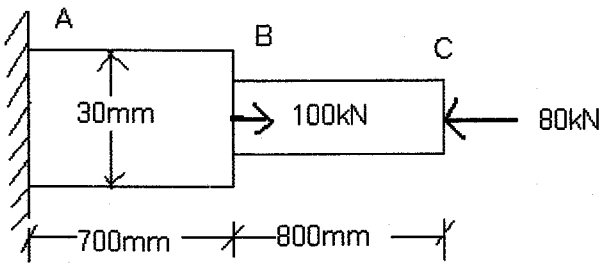

Fig. 1

2 Attempt any **two** :

(i) A hollow circular shaft of 150mm external diameter, and thickness 20mm is rotating at 200rpm. The angle of twist on 3m length was found to be 0.7°. Calcualte the power transmitted and maximum shear stress induced in the material. 8

(ii) A steel shaft of solid circular cross section has to transmit 200kW at 180rpm. The maximum shear stress is not to exceed 50MPa and the angle of twist must not be more than 1.6° in a length of 2.6m. Design the suitable diameter of shaft. Take G=80GPa. 8

(iii) Two steel rods and one copper rod each of 20mm diameter, together support load of 20kN as shown in **Fig.** Find the stresses in rods. Take E_{st} and E_{cu} as 205 GN/m^2 and 110 GN/m^2. 8

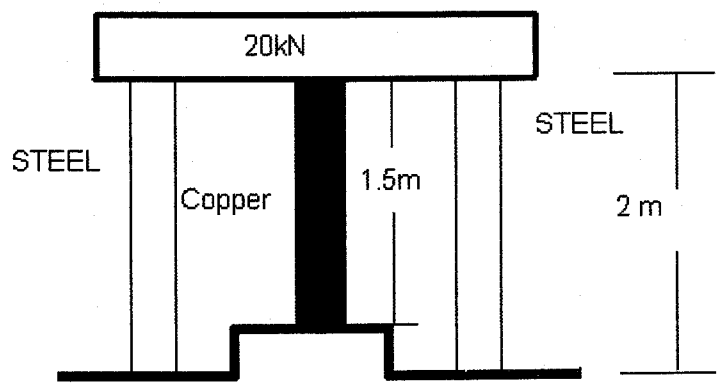

Fig. 2

3 Define following : **8**

(a) Point of contraflexure

(b) Overhanging beam

(c) Bending stress

(d) Section modulus.

4 Attempt any three from following : **27**

(1) Draw shear force and bending moment diagram of a given beam. **(Fig. 3.)**

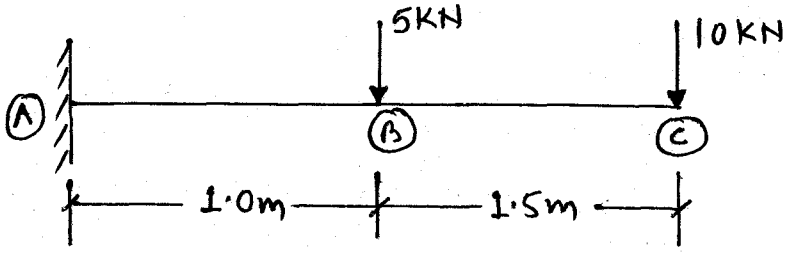

Fig. 3

(2) Draw shear force and bending moment diagram of a given beam. (**Fig. 4**)

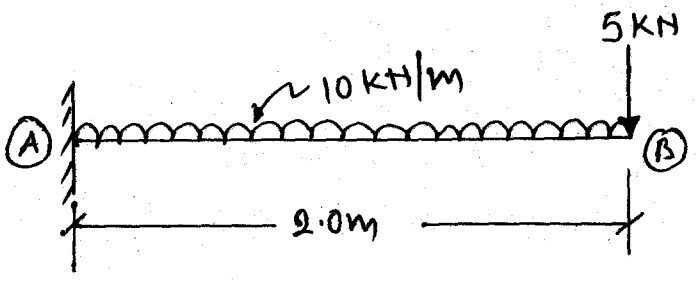

Fig. 4

(3) Calcualte the maximum bending stress induced in a cast iron pipe of external diameter 50mm, internal diameter 30mm and length 4.5 meter when the pipe is supported at its ends (simply sypported) and carries a point load of 100N at its centre.

(4) The simply supported beam of rectangular c/s size 100mm×200mm depth of length 3.0m subjected to point load of 30kN at centre. Calculate the maximum shear stress in the beam and plot shear stress distribution diagram across the section.