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Total No. of Questions : 09

B.Tech.(CE) (Sem.–3) (2011 Batch)

STRENGTH OF MATERIALS

Subject Code : BTCE–303

Paper ID : [A1133]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

   a. A simply supported beam of uniform cross-section is subjected to a maximum bending moment of 30kNm. If its cross-section is a hollow tube with outer diameter 40 mm and inner diameter 30 mm, find the value of maximum bending stress.

   b. Find the ratio of total elongation of a bar of uniform cross-section produced under its own weight to the elongation produced by an external load equal to the weight of the bar.

   c. Find the ratio of the torsional moments of resistance of a solid circular shaft of diameter 'D' and a hollow circular shaft having external diameter 'D' and internal diameter '0.6D'.

   d. A bar 40 mm in diameter is subjected to an axial load of 40kN. The extension of the bar over a gauge length of 200mm is 0.3mm. The decrease in diameter is 0.018mm. Find the Poisson's ratio.

   e. Briefly explain the maximum principal stress theory of failure.

   f. If an element is subjected to pure shearing stress of 30MPa, then find the value of maximum principal stress.

   g. Plot the shear stress *v/s* shear str
   materials.

   h. How are the Young's modulus of
   related?

   i. Briefly explain the difference bet
   axis'.

   j. Briefly explain 'Polar Moment of In

SECTION-

2. For a shaft in pure torsion, carrying 8
   requires the shaft to have a hollow c
   outside diameter. Determine the maxin
   have without exceeding the allowable
   G = 80GPa.

3. A 5m long hollow tube with outer ar
   30mm, respectively, was found to ex
   tensile load of 90kN. Determine

   (a) the buckling load for the tube whe
   ends

   (b) safe compressive load with a factor

4. A main water pipe having external and
   1.50 m, respectively, supplying water to
   maximum span on which the pipe may be
   a bending stress of 60MPa. The unit v
   taken as 76.0kN/m^3 and 10kN/m^3, resp

5. A 40mm square bar of length 160mm is
   load of 20kN. If the lateral strains ar
   uniform external pressure of suitable inte

   (a) the intensity of pressure and

   (b) the change in the volume. Modulus c
   the material are 200GPa and 0.25, r

6. Determine the reactive forces in the cable supported beam loaded and supported as shown in Fig. 1

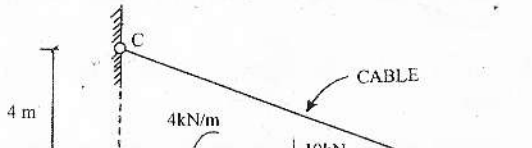

Fig. 1

SECTION-C

7. A vertical pole ACB is rigidly fixed at its base A and carries loads as shown in Fig. 2.

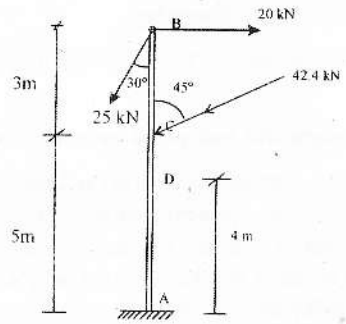

Fig. 2.

(i) Draw the axial force, shear force and bending moment diagrams for the pole.

(ii) Determine the magnitude and direction of the horizontal force applied at D which would be required if the fixing moment at A is to be zero.

8. At a point in a strained body direct ter 70MPa act on mutually perpendicular pla stress that can be applied so that the majo 135MPa. Also determine the minor princ shear stress developed in the material. Also planes and maximum shear stress planes. S oriented elements as well. Use the Mohr's

9. A composite bar of size 26mm × 28 mm c flat bar of aluminium alloy 26mm wide and bars each 26mm wide and 10mm thick. together at their ends when the temperatur

(a) Determine the stress in each of the mate the composite bar is raised to 52°C.

(b) At this stage an axial compressive load composite bar, compute the final stresse modulus of elasticity and coefficient of 200GPa and 12 × 10^{-6}/°C, respectively, 65GPa and 22 × 10^{-6}/°C, respectively.