Q.P. Code: **16CE104** **R16**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech II Year I Semester (R16) Regular Examinations November 2017

STRENGTH OF MATERIALS

(MECHANICAL ENGINEERING)

Time: **3 hours** Max. Marks: **60**

(Answer all Five Units **5 X 12 = 60** Marks)

UNIT-I

1 a. Find the Young's Modulus of a brass rod of diameter 25 mm ad of length 300 mm subjected to a tensile load of 60 kN when the extension of the rod is equal to 0.2 m. 8M

b. Define Poisson's ratio and Factor of safety 4M

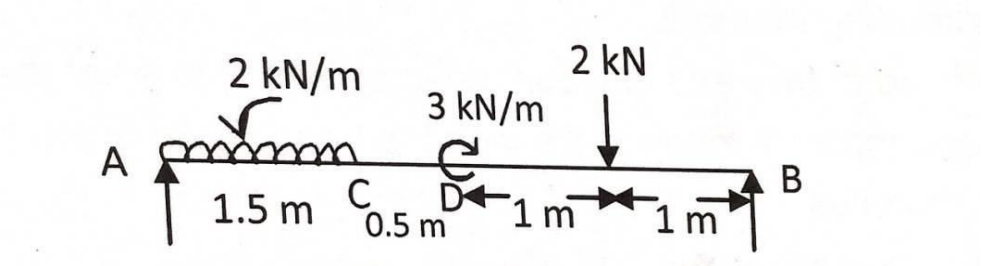
OR

2 a. A tension bar 5 m long is made up of two parts, 3m of its length has a cross-sectional area 10 cm^2 while the remaining 2 m has a cross-sectional area of 20 cm^2. An axial load of 80 kN is gradually applied. Find the total strain energy produced in the bar and compare this value with that obtained in a uniform bar of the same length and having the same volume when under the same load. Take E= 2 x 10^5 N/ mm^2. 8M

b. Write the classification of stresses. 4M

UNIT-II

3 a. Draw shear force and bending moment diagram for the following beam

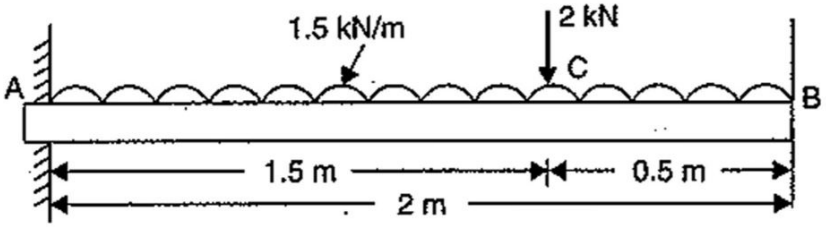


8M

b. Draw shear force and bending moment diagram for cantilever beam subjected to uniformly distributed load. 4M

OR

4 a. Draw shear forc and bending moment diagram for the following beam



8M

b. Draw the SFD and BMD for simply supported beam carrying uniformly distributed load of whole length and also derive equation for it. 4M

UNIT-III

5 a. A cast Iron beam is of T- section has the following dimensions Flange: 100 mm x 20 mm Web: 80 mm x 20 mm. The beam is simply supported on a span of 8 meters and carries a uniformly distributed load of 1.5 kN/m length of entire span. Determine the maximum tensile and compressive stresses. 8M

b. An I-section has 100 mm wide and 12 mm thickness, a web of 120 mm height and 10 mm thickness. The section is subjected to bending moment of 15 kN-m and shear force of 10 kN. Find the maximum bending stress and maximum shear stress and draw shear stress distribution diagram. 4M

OR

6 a. A Timber beam of rectangular section is simply supported at the ends and carries a point load at center. The maximum bending stress is 12 N/mm^2 and maximum shear stress is 1 N/mm^2. Find the ratio of span of depth 6M

b. The shear force acting on a beam at a section is 'F'. The section of the beam is triangular base b and of an altitude h. The beam is placed with its base horizontal. Find the maximum shear stress and the shear stress at the neutral axis. 6M

UNIT-IV

7 a. A beam 6 m long, simply supported at its ends, is carrying a point load of 50 kN at its center. The moment of inertia of the beam is given as equal to 78 x 106 mm^4 and. If E for the material of the beam = 2.1 x 10^5 N/mm^2, calculate: (i) deflection at the centre of the beam and (ii) slope at the supports. 6M

b. Derive the expression for slope and deflection of a simply supported beam carrying a uniformly distributed load by Mohr's theorem. 6M

OR

8 a. A beam of length 5 m of uniform rectangular section is supported at its ends and carries a uniformly distributed load over the entire length. Calculate the depth of the section if the maximum permissible bending stress is 8 N/mm^2 and central deflection not to exceed 10 mm. Take E = 1.2 X 10^4 N/mm^2. 5M

b. Derive the expression for slope and deflection of a simply supported beam carrying a uniformly distributed load of w per unit length over the entire length using double integration method. 7M

UNIT-V

9 a. A cantilever beam of length 3m carries a uniformly distributed load of 80 kN/m over the entire length. If E= 2 x 108 kN/m^2 and I=1 x 108 mm^4, find the slope and deflection at the free end using conjugate beam method. 6M

b. Derive the expression for slope and deflection of a simply supported beam with a point load at the center by Conjugate beam method. 6M

OR

10 a. A tensile test, a test piece 25 mm in diameter, 200 mm gauge length stretched 0.0975 mm under a pull of 50,000 N. In a torsion test the same rod twisted 0.025 rad over a length of 200 mm, when a torque of 400 Nmm was applied. Evaluate the Poisson's ratio and the three elastic moduli for the material. 6M

b. A hollow shaft is to transmit 300kW power at 80 rpm. If the shear stress is not exceed 60 N/mm^2 and the internal diameter is 0.6 of the external diameter. Find the external and internal diameters assuming that the maximum torque is 1.4 times the mean. 6M

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