Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[5668]-103

S.E. (Civil) (First Semester) EXAMINATION, 2019

STRENGTH OF MATERIALS

(2015 PATTERN)

Time : Two Hours **Maximum Marks : 50**

Instructions:

i. Neat diagrams must be drawn wherever necessary.
ii. Figures to the right indicate full marks.
iii. Use of electronic pocket calculator is allowed.
iv. Assume suitable data, if required.
v. Answer Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8

Q.No.1 a) A copper wire of length 600mm is subjected to an axial pull of 10 kN. Find the minimum diameter so that stress is not to exceed 75 MPa. Also calculate the elongation if E=100 GPa. **(06)**

Q.No.1 b) A 300mm x 400mm wooden cantilever beam weighing 0.75 kN/m carries an upward concentrated load of 20 kN at the end as shown in Fig. 1. Determine the maximum bending stress at a section 2m from the free end. **(06)**

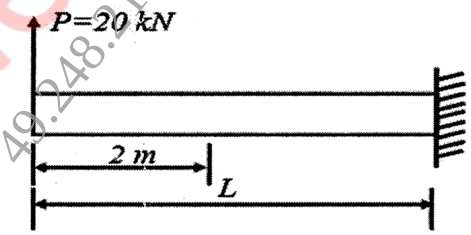

Figure No. 1

OR

Q.No.2 a) A steel rod 30 mm in diameter and 1m long is heated through 100^0K and at the same time subjected to a pull 'P'. If the total extension of the rod is 2mm, what should be the magnitude of P? Take $\alpha_s = 12\times 10^{-6}/^0C$, $E_s = 200$ GPa **(06)**

P.T.O.

Q.No.2 b) A timber beam 100 mm wide and 150mm deep supports a uniformly distributed load over a span of 2 meters. If the safe stresses are 28 MPa in bending and 2 MPa in shear, calculate the maximum load which can be supported by the beam. **(06)**

Q.No.3 a) A solid circular shaft is required to transmit 90 kW while turning at 50 rev/s. The allowable shearing stress is 120 MPa. Find the required shaft diameter. **(06)**

Q.No.3 b) Resultant stresses on two mutually perpendicular planes are as shown in Fig.2, Calculate the principal stresses and their directions. **(06)**

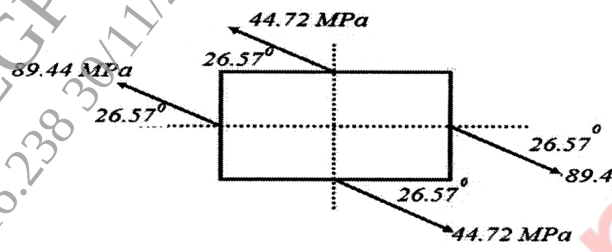

Figure No. 2

OR

Q.No.4 a) A bar 12mm in diameter gets stretched by 3mm under a steady load of 8000N. What stress would be produced in the same bar by a weight of 800N which falls vertically through a distance of 80mm on to a rigid collar at its end? The bar is initially unstressed. Take E= 200 GPa. **(06)**

Q.No.4 b) What are the various theories of failure? Explain any one of them in brief. **(06)**

Q.No.5 a) Draw shear force and bending moment diagram for the beam ABCDE shown in Fig.3. **(07)**

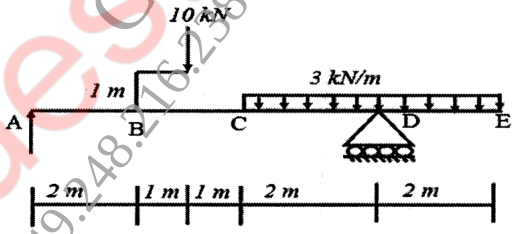

Figure No. 3

Q.No.5 b) Draw the loading diagram and bending moment diagram from the given shear force diagram of a beam as shown in Fig. 4. **(06)**

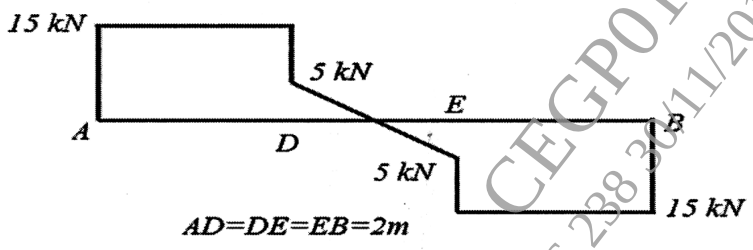

Figure No. 4

OR

Q.No.6 a) For a cantilever beam fixed at one end weighs 2 kN/m carries a point load of 10 kN at it's free end. Draw shear force and bending moment diagram for the beam. Assume span of the beam as 8 m. **(06)**

Q.No.6 b) Draw the loading diagram and bending moment diagram from the given shear force diagram of a beam as shown in Fig. 5. **(07)**

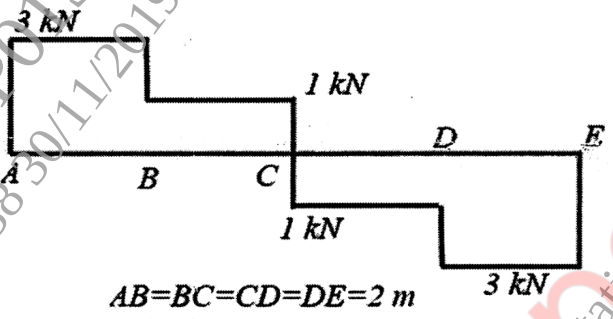

Figure No.5

Q.No.7 a) What are the assumptions made in the Euler's Theory? Also state it's limitations. **(07)**

Q.No.7 b) A steel rod 5m long and of 40 mm diameter is used as a column with one end fixed and other is free. Determine the crippling load by Euler's formula. Take E=200 GPa. **(06)**

OR

Q.No.8 a) Define core of a section and hence obtain core of section for a circular section of diameter 'D'. **(06)**

Q.No. 8 b) A column supports a load of 600 kN as shown in Fig. 6. Find the stresses at the corners of the columns at its base. **(07)**

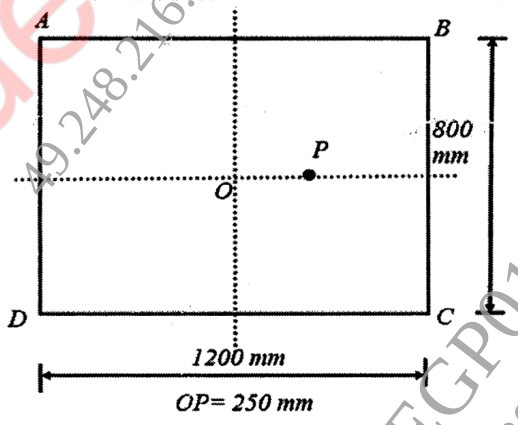

Figure No. 6