B.TECH SEM - III (2007 COURSE) MECHANICAL ENGG./ PRODUCTION ENGG. : WINTER - 2017

SUBJECT: STRENGTH OF MACHINE ELEMENTS (C)

Day : **Friday** Time : **10.00 AM TO 01.00 PM**
Date : **12/01/2018** **W-2017-2379** Max. Marks: 80

N. B.:

1) **Q. No. 1** and **Q. No. 5** are **COMPULSORY.** Out of remaining attempt **ANY TWO** questions from each section.
2) Figures to the right indicate **FULL** marks.
3) Answer to both the section should be written in **SEPARATE** answer book.
4) Assume suitable data if, necessary.
5) Use non-programmable **CALCULATOR** is allowed.

SETION-I

Q.1 **a)** A wrought iron bar 50 mm in diameter and 2.5 m long transmits a shock energy of 100 Nm, Find the maximum instantaneous stress and the elongation, take E = 200 GN/m^2. **(05)**

b) Explain the effect of silicon, manganese, sulphur and phosphorus on cast Iron. **(05)**

c) A thin cylinder of 100 mm internal diameter and 5 mm thickness is subjected to an internal pressure 10 MPa and torque of 2000 Nm. Calculate the magnitude of the principal stresses. **(04)**

Q.2 **a)** Find the weight which falls through a height of 5 m on coller attached to the lower of a vertical rod of diameter 40 mm and length 3 m. The deflection produced in the rod is 5 mm. Take E = 200 GPa. **(09)**

b) Explain weighted point method for section of material. **(04)**

Q.3 A circular shaft of 80 mm diameter is subjected to combined bending and twisting moments, the bending moment being four times the twisting moment. Find the allowable twisting moment according to **(13)**

i) Maximum principal stress theory.
ii) maximum shear stress theory
iii) Distortion energy theory.

Given, the stress at the elastic limit is 4 N/mm^2 and factor of safely is 3.

Q.4 A bar of steel is 60 mm x 60 mm in section and 180 mm long . It is subjected to a tensile load of 300 kN along the longitudinal axis and tensile loads of 750 kN and 600 kN on the lateral surfaces. Find the change in the dimensions of the bar and the change in the volume. Take E = 200 GN/m^2 $\mu = 0.3$. **(13)**

SETION-II

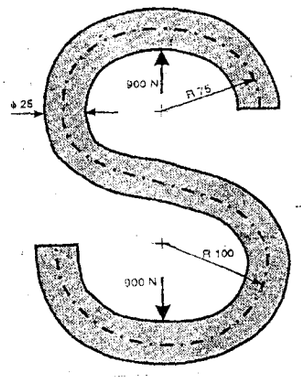
Q.5 **a)** Distinguish between cotter joint and knuckle joint. **(05)**

b) Prove that the relation, $M/I = \sigma/y = E/R$. **(05)**

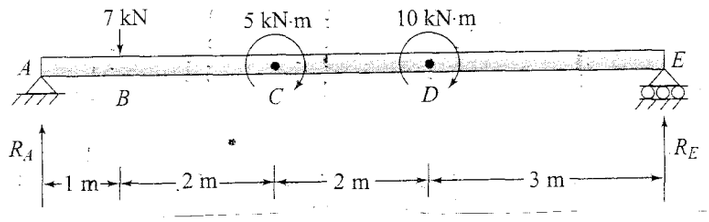
c) Explain with neat sketch 'Bolt of uniform strength **(04)**

P.T.O.

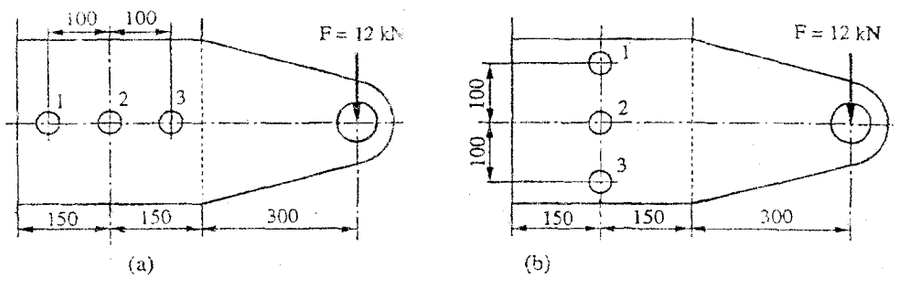
Q.6 A open 'S' link is made of 25 mm diameter rod. Determine the maximum tensile stress and maximum shear stress. **(13)**



Q.7 Draw shear force and bending moment diagram for the beam shown **(13)**



Q.8 A bracket has to be fixed to a wall using bolts. Two possible arrangements fixing them are shown in figure a) and b). Determine the size of bolts required in each case, if the yield strength of the bolt material is 410 Mpa. Assume factor of safety as 3. **(13)**



Size	Pitch (mm)	Stress Area (mm^2)
M24	3	353
M30	3.5	561
M33	3.5	694
M36	4	817

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