

Total No. of Printed Pages:4

SUBJECT CODE NO:- E-350
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(Mech) (CGPA) Examination Nov/Dec 2017
Strength of Material
(REVISED)

[Time: Three Hours]

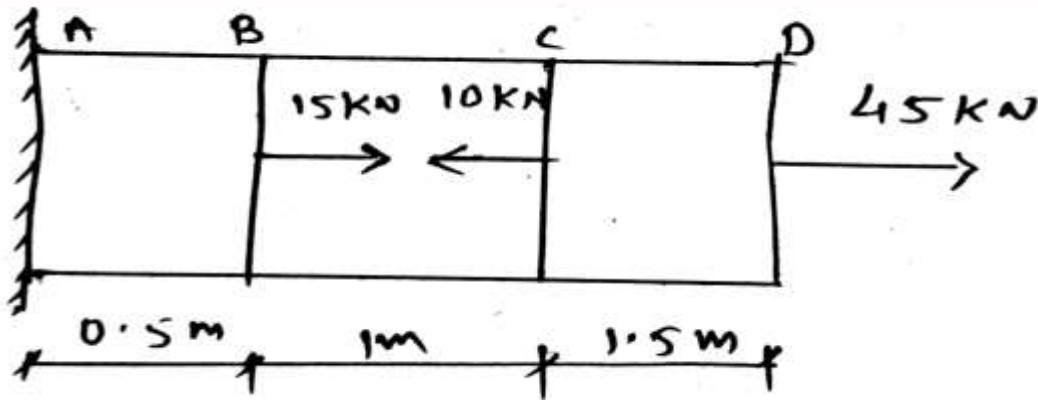
[Max.Marks:80]

Please check whether you have got the right question paper.

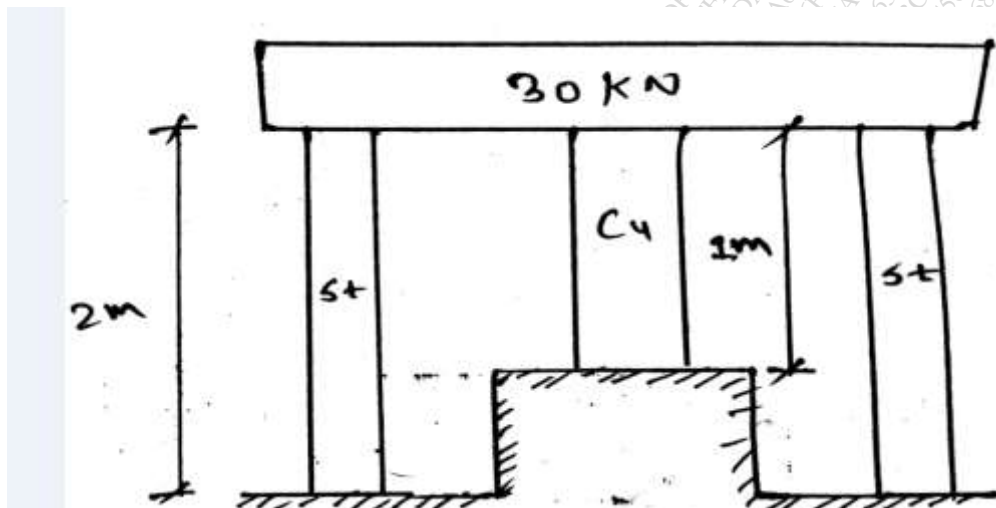
- N.B
1. Q.No.1 & 6 are compulsory. Attempt any two from remaining from each section.
 2. Figures to right indicates full marks.
 3. Assume suitable data if necessary.

Section A

- Q.1 Attempt any five: 10
- a) Explain Bulk modulus
 - b) Explain types of Beams.
 - c) State the relation between loading, shear force and bending moment
 - d) Define strain and types of strain
 - e) What are the assumptions in the theory of pure bending?
 - f) Explain thermal stresses
 - g) Define modulus of section
 - h) Define neutral axis.
- Q.2 a) A steel bar ABCD of cross-section 500 mm^2 is acted upon by forces as shown in fig. calculate elongation of bar, take $E = 2 \times 10^5 \text{ N/mm}^2$ 07

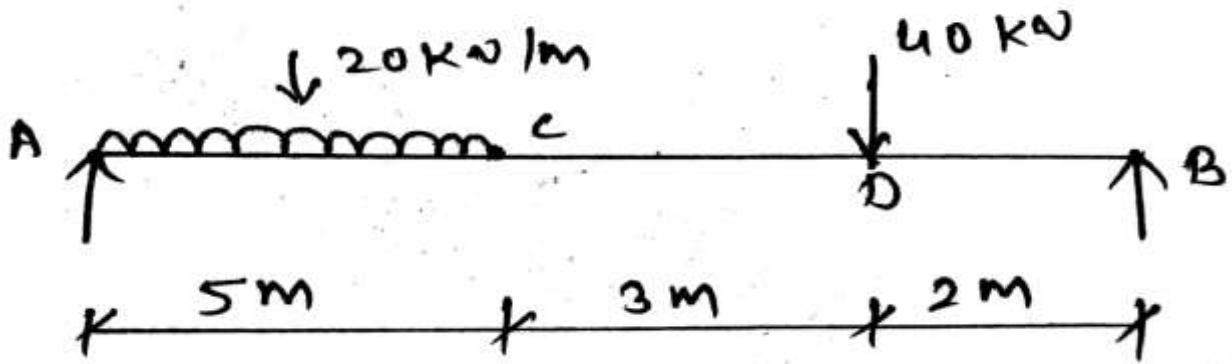


- b) Two steel rods and one copper rod each of 25mm dia., together supports a load of 30kN as shown in fig. find the stresses developed in the rods. If $E_{steel} = 210 \text{ GPa}$, and $E_{copper} = 110 \text{ GPa}$



Q.3 Draw S.F.D and B.M.D for simply supported beam shown in fig.

15



Q.4 A beam of I-section is simply supported on a span of 6m. The section consists of a top flange $60\text{mm} \times 20\text{mm}$ thick, web 180mm deep & 20mm thick and bottom flange $160\text{mm} \times 40\text{mm}$ thick. Find the UDL on the beam, if the tensile stress shall not exceed 30 N/mm^2 . Also find the corresponding maximum compressive stress.

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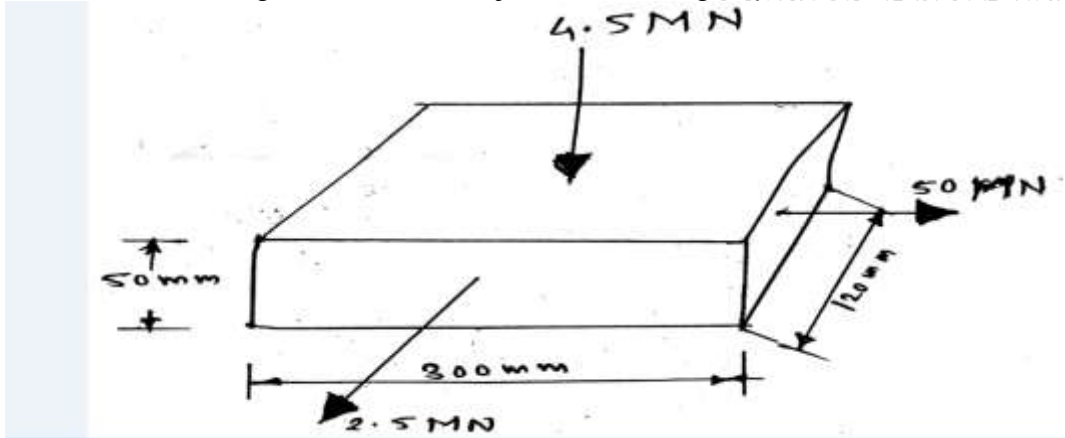
Q.5 a) A simply supported timber beam 150 mm wide \times 300 mm deep is supported over a span of 4.5m. It is loaded with a uniform load of 8 kN/m. compute.

08

- 1) Shear stress developed on a layer 60 mm above the neutral axis of a section located at 1.5m from the left support.
- 2) Maximum shear stress on the above section

3) Maximum shear stress anywhere in the beam.

b) Determine the change in volume of object shown in fig. if $\mu = 0.3$ and $E = 2 \times 10^5 \text{ N/mm}^2$ 07

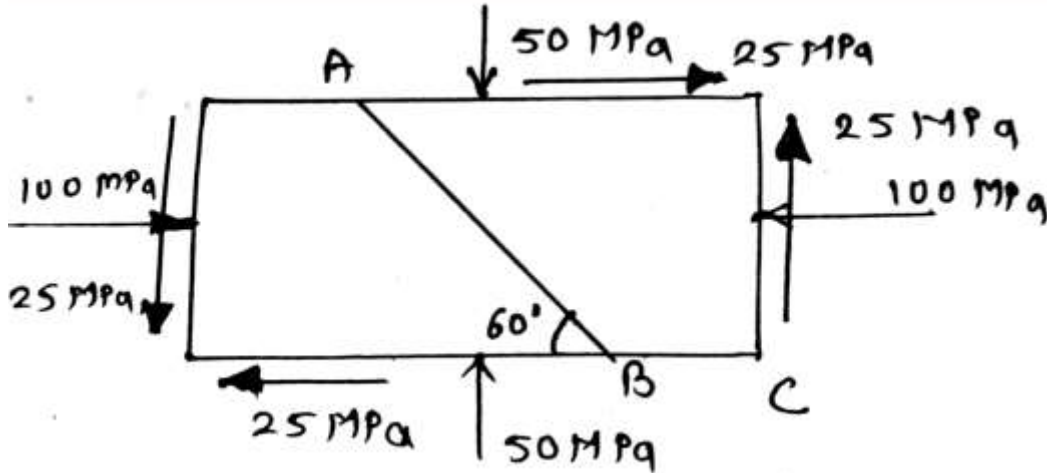


Section B

- Q.6 Attempt any five: 10
- Define limit of eccentricity
 - State torsion formula.
 - Explain core or kernel of sections.
 - Define principal planes and principal stresses
 - Explain types of stresses in thin cylindrical shell
 - Define modulus of Resilience
 - Types of loading in strain energy, state and explain.
 - State the relation between bending moment and slope.
- Q.7 a) A solid steel shaft has to transmit 100 kw at 160 r.p.m. taking allowable shear stress at 70 MPa. Find the suitable diameter of shaft. The maximum torque transmitted in each revolution exceeds the mean by 20%. 08
- b) A vertical steel rod of uniform diameter 30mm and 2.5 m long subjected to a load of 2KN dropping from 20mm on a collar at a lower end of bar. If top end of bar is fixed, calculate, 07
- Instantaneous stress produced
 - Strain energy
- Take $E = 2 \times 10^5 \text{ N/mm}^2$
- Q.8 a) A cylindrical vessel whose ends are closed by means of rigid flange plate is made of steel plate 3mm thick. The internal length and dia. of vessel are 500 mm and 250mm respectively. Determine the longitudinal and circumferential stresses in the cylindrical shell due to an internal fluid pressure 3 N/mm². Also determine increase in length, diameter and volume of vessel. Take $E = 200 \text{ GPa}$, $\mu = 0.3$ 08

- b) A rectangular column 200mm wide and 150mm thick is carrying a vertical load of 120 kN at 07 an eccentricity of 50mm in a plane bisecting the thickness. Determine the maximum and minimum intensities of stress in section

- Q.9 A machine component is subjected to the stresses as shown in the figure. Find the normal and shearing stresses on the section AB inclined at an angle of 60° with x-x axis. Also find the resultant stress on the section.



- Q.10 A beam is 10m long and is simply supported at the ends. It carries point loads of 100 kN and 60kN 15 at a distance of 3m and 5m respectively from left end. Find the deflection under each load. Find also the maximum deflection. Take $E = 200 \text{ GPa}$, $I = 18 \times 10^8 \text{ mm}^4$