

4226

BOARD DIPLOMA EXAMINATION, (C-14)

JUNE-2019

DCE - THIRD SEMESTER EXAMINATION

MECHANICS OF SOLIDS

Time:3Hrs

Max. Marks:80

**PART-A****10x3=30M**

**Instructions:** 1) Answer all the questions Each question carries 3 marks  
2) Answer should be brief and straight to the point and shall not exceed five simple sentences.

- 1) Sketch the SF and BM diagrams of a simply supported beam of span 'L' subjected to point load 'W' at mid span.
- 2) A cantilever of beam of span 3.0m subjected to u.d.l of intensity 10kN/m acting throughout the span. Calculate the values of maximum SF and maximum BM.
- 3) Draw the sketches of any four types of beams.
- 4) Calculate maximum shear stress in a cross section of a rectangular beam of size 250x450mm subjected to a Shear Force of 50 kN.
- 5) Sketch the bending stress and shear stress distribution across the depth of rectangular cross section of a beam subjected to lateral loads.
- 6) Calculate the section modulus of a Hollow circular section of external dia. 120mm and thickness 10mm.
- 7) Draw the deflected shapes of 'cantilever beam' and 'fixed beam' subjected to lateral loads.
- 8) The maximum slope of a cantilever beam of span 3.0m subjected to free end point load is  $1^\circ$ . Find maximum deflection.

- \* 9) Write the formula for maximum slope and deflection of a cantilever beam of length  $L$ , carrying a concentrated load  $W$  at a distance  $L/2$  from its fixed end.
- 10) Define Mohr's theorem for slope and Deflection.

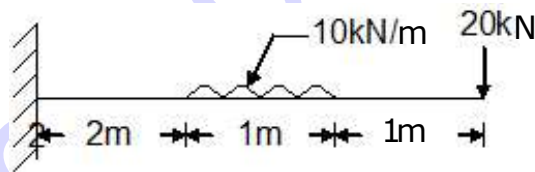
### PART - B

**5x10=50M**

**Instructions:** 1) Answer any five questions Each question carries 10 marks

2) Answer should be comprehensive and the criterion for valuation is the content but not length of the Answer.

- 11) A simply supported beam of span 6.0m subjected to three point loads 40kN, 30 kN & 50 kN at 1.5m, 4.0m and 5.0m respectively from the LHS. Plot SFD and BMD.
- 12) Plot Shear Force and Bending Moment Diagrams of the beam shown in figure



- 13) A Rolled Steel 'I' beam of overall depth 300mm is simply supported over an effective span of 8 m and carries uniformly distributed load of 30 kN/m throughout the span. Find the maximum bending stress developed in the beam.  $I_{xx}$  of I-Section is  $170 \times 10^6 \text{ mm}^4$ .
- 14) A beam of T section, 5 m long carries a UDL  $w/m$  throughout its length. The beam is simply supported at its ends. The Flange and web of T-Section are  $100 \times 12 \text{ mm}$  and  $200 \times 12 \text{ mm}$ . What is the maximum value of UDL ( $w$ ) so that the bending stress in the section does not exceed  $75 \text{ N/mm}^2$ .
- \* 15) A Cantilever beam of span 4.0m carries an Udl of  $12 \text{ kN/m}$  over the entire span and a point load of  $20 \text{ kN}$  is acting at the free end. Find the maximum slope and deflection using Mohr's theorems. Take  $EI = 4000 \text{ kN-m}^2$ .

- \*16) A simply supported beam of span 6.0m subjected to a concentrated load of 80kN acts at 2.5m from Left hand support. Find maximum deflection. Assume  $EI=7500\text{kN}\cdot\text{m}^2$ .
- 17) A thin cylinder of length 2.0m, internal diameter 500mm and wall thickness 15mm is subjected to an internal fluid pressure of  $5\text{N}/\text{mm}^2$ . If  $E=2\times 10^5 \text{ N}/\text{mm}^2$  and poisson's ratio is 0.3 find changes in length, diameter and volume.
- 18) Determine the diameter of a solid shaft to transmit a power of 300kW at 250 r.p.m. The shear stress is not to exceed  $30 \text{ N}/\text{mm}^2$  and angle of twist is not to exceed  $1^\circ$  in a shaft length of 2.0m. Take modulus of rigidity  $G = 0.8\times 10^5 \text{ N}/\text{mm}^2$ .

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