



C14-C-302

4221

BOARD DIPLOMA EXAMINATION, (C-14)

MARCH / APRIL - 2019

DCE - III SEMESTER EXAMINATION

MECHANICS OF SOLIDS

Time : 3 Hours]

[Total Marks : 80

PART - A

3×10=30

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

- 1 Define the terms : $1\frac{1}{2}+1\frac{1}{2}$
 - (a) Shear Force
 - (b) Bending Moment

- 2 Draw SFD and BMD for a cantilever beam subjected to $1\frac{1}{2}+1\frac{1}{2}$
point load at free end?

- 3 State the relation between rate of loading, shear force and **3**
Bending Moment at a section?

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- 4 Write the bending equation with usual notations. 3
- 5 Sketch the bending stress distribution diagram for a beam of rectangular cross-section? 3
- 6 A wooden beam 100 mm wide, 200 mm deep and 3 m span is carrying an udl of 30 kN/m. Determine maximum shear stress? 3
- 7 Define : $1\frac{1}{2}+1\frac{1}{2}$
(a) Slope
(b) Deflection ?
- 8 Distinguish between the strength and stiffness? $1\frac{1}{2}+1\frac{1}{2}$
- 9 State Mohr's theorems. $1\frac{1}{2}+1\frac{1}{2}$
- 10 A cantilever beam of span 3 m carries a point load of 20 kN at its free end. Calculate the slope and deflection at the free end using Mohr's theorems. $1\frac{1}{2}+1\frac{1}{2}$
Take $EI = 4000 \text{ kN/m}^2$.

PART - B**10×5=50**

- Instructions :**
- (1) Answer any **FIVE** questions.
 - (2) Each question carries **TEN** marks.
 - (3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

- 11** A beam ABCD is supported at A and D such that **10**
AB =1.5 m, BC = 2.5 m and AD = 5 m, It carries point loads of
30 kN and 20 kN at B and C respectively. It also carries a udl
of 10 kN/m including self weight on entire span. Draw SFD and
BMD.
- 12** A beam 8 m long carries an udl of 2 kN/m on the entire span. **10**
The beam has an overhang of 1 m and 1.5 m after left hand
support and right hand support respectively. The spacing between
the supports is 5.5 m. Draw the SFD and BMD indicating the
values at salient points.
- 13** A Rolled steel beam of I-section with top flange 150 × 10 mm, **10**
bottom flange 200 × 10 mm and web 280 x 10 mm is supported
over a span of 5 m. If the permissible stress are 100 N/mm² in
compression and 25 N/mm² in tension. What udl can be safely
applied on the beam.
- 14** A beam of I-section 600 mm deep and 200 mm wide has equal **10**
flanges 20 mm thick and web 10 mm thick. It carries at a cross-
section a shear force of 200 kN. Determine the shear stress
distribution in a beam.

- 15** A cantilever 1.8 m long is carrying load of 20 kN at the free end and 30 kN load at a distance of 0.9 m from the free end. Find the slope and deflection at the free end by Moment area method. Given $E = 200 \text{ kN/mm}^2$ and $I = 150 \times 10^6 \text{ mm}^4$? **10**
- 16** A simply supported beam of span 8 m carries three point load of 30 kN, 20 kN and 50 kN at a distance of 2 m, 4 m and 6 m respectively from LHS. Determine the position and amount of Max. Deflection. If moment of inertia for the beam is $695 \times 10^6 \text{ mm}^4$ and $E = 200 \text{ kN/mm}^2$ use Macaulay's method? **10**
- 17** The inside diameter of the shell is 0.9 m and its length is 2 m, the thickness shell is of 15 mm. Find the hoop stress and longitudinal stresses set up and the changes in dimensions of the shell when a fluid is introduced in it at a pressure of 1.5 N/mm^2 Take $E = 200 \text{ kN/mm}^2$ and $\mu = 0.3$. **5+5**
- 18** Two solid shafts A and B are made of the same material. Each shaft transmits the same power, shaft A running at 200 rpm, while the shaft B running at 20,000 rpm. Find the ratio of diameters of the two shafts, if the maximum shear stress develop is same in each shaft. **10**
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