

4226

BOARD DIPLOMA EXAMINATION, (C-14)

MARCH /APRIL-2019

DCE - THIRD SEMESTER EXAMINATION

MECHANICS OF SOLIDS

Time: 3 Hours ]

[Max. Marks : 80

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

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

- 1) Draw the neat sketch of simply supported beam, fixed beam and cantilever beam.
- 2) Define Shear Force and Bending Moment.
- 3) Calculate the maximum SF and Maximum BM of a simply supported beam of span 6.0m subjected to u.d.l of 5kN/m acting throughout the span.
- 4) Write the expression for section modulus of a Hollow circular section of external diameter 'D' and internal diameter 'd'.
- 5) Draw the sketches for shear stress distribution across 'Rectangular' and 'Circular' sections showing their maximum values.
- 6) Define Neutral Axis and Flexural Rigidity.
- 7) Define Slope and Deflection.
- 8) The maximum slope of a Simply supported beam of span 4.0m subjected to mid point load is  $2^\circ$ . Calculate maximum deflection.
- 9) Write the formula for maximum slope and deflection of a cantilever beam of length L, carrying a concentrated load W at free end.
- 10) Define Mohr's theorem-I.

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**PART-B**

**Instructions:** 1) Answer any **five** questions. **5X10= 50M**  
2) Each question carries **ten** marks.  
3) Answers should be comprehensive and the criterion for valuation is the content but not the length of answer.

- 11) A cantilever 3m long is subjected to three point loads 30kN, 25kN and 15 kN at 1.0m, 2.0m and 3.0m from the fixed end. Draw the SFD and BMD for the beam indicating their salient values.
- 12) A beam of length 7.0m is simply supported on a span of 5m, with a overhang of 2.0m in the right hand portion. It carries an udl of 10kN/m on a length of 5m from L.H.S and a point load of 25kN at 7.0m from L.H.S. Draw the SF and BM diagrams.
- 13) A rectangular beam of breadth 240mm and depth 480mm is simply supported over a span of 7m. Find the max. udl the beam can carry if the bending stress is limited to 17 N/mm<sup>2</sup>.
- 14) A rectangular beam is simply supported over a span of 5m subjected to udl of 25 kN/m throughout the span. If the bending stress is limited to 15N/mm<sup>2</sup>. Design a suitable rectangular beam, if  $b = 0.6d$ .
- 15) A Cantilever beam of length 3.5m is subjected to two point loads 25kN and 30kN acting at 2.0m and 3.5m from fixed end. Find maximum slope and deflection. Take  $EI = 8000\text{kN-m}^2$ .
- 16) A simply supported beam of span 5.0m subjected to a point load of 40kN at 2.0m from L.H.S. Find the value of maximum deflection. Take  $EI = 6500\text{kN-m}^2$ .
- 17) A thin cylinder of length 2.0m, internal diameter 500mm and wall thickness 15 mm is subjected to an internal fluid pressure of 5N/mm<sup>2</sup>. If  $E = 2 \times 10^5 \text{ N/mm}^2$  and poisson's ratio ( $\nu$ ) is 0.3 find Hoop stress, longitudinal stress, change in length, change in diameter and change in volume.
- 18) Calculate maximum torque transmitted by a solid circular shaft of 250mm diameter, if safe allowable shear stress is 50N/mm<sup>2</sup> and maximum angle of twist is 0.3°/m length of the shaft. The modulus of rigidity of the shaft material  $G = 0.8 \times 10^5 \text{ N/mm}^2$ .

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