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C09–C–303

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BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2018

DCE—THIRD SEMESTER EXAMINATION

STRENGTH OF MATERIALS AND
THEORY OF STRUCTURES

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30

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

1. Draw the shear stress distribution for *(a)* rectangular cross-section and *(b)* *I*-section.

2. A brass strip 100 mm wide and 20 mm thick is bent into an arc of radius 50 metres. What is the maximum stress developed in the strip, if E for brass is 100 kN/mm^2?

3. State the Mohr's theorems.

4. A simply supported beam of span 4 m carries a total u.d.l. of 250 kN distributed over its entire span. If the value of EI is $3 \quad 10^{13}$ $N\,mm^2$, calculate the maximum deflection.

5. Define *(a)* stiffness of the beam and *(b)* flexural rigidity.

6. Differentiate between a strut and a column.

7. A square column of size 200 mm × 200 mm, 4 m long is fixed at both ends. Find the Euler's crippling load on the column, if E 200 kN / mm^2.

8. A masonry dam of rectangular cross-section is 12 m high and 6 m wide. It retains water to its full height. Find the resultant force of self-weight of the dam and water pressure. Specific weight of masonry is 20 kN/m^3.

9. Define *(a)* statically determinate frame and *(b)* statically indeterminate frame.

10. A circular steel shaft of 40 mm diameter is subjected to a torque of 0·75 kNm. Determine the angular twist over a length of 2 m. Modulus of rigidity of steel is 80 kN/mm^2.

PART—B

10×5=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. A simply supported beam of span 3 m carries a u.d.l. of 20 kN/m over whole span. Depth of the beam is twice its breadth and maximum permissible bending stress is 10 N / mm^2. Find the cross- sectional dimensions of the beam.

12. A beam of *I*-section 500 mm deep and 250 mm wide has equal flanges 20 mm thick and web 10 mm thick. The maximum shear force in the beam is 200 kN. Determine the average shear stress and maximum shear stress in the beam.

13. A cantilever beam *AB* of span 3·5 m is fixed at *A* and propped at *B*. It carries a point load of 20 kN at its mid span. Find the reaction of the prop and draw SFD of the cantilever showing the values at salient points.

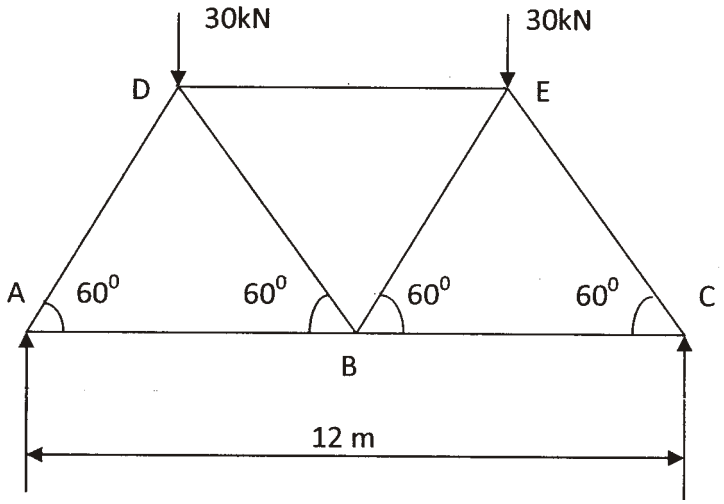
14. A simply supported beam of span 5 m carries a u.d.l. of 10 kN/m over its entire span. Determine the section of the beam, if the central deflection is limited to 25 mm. The depth of the beam is twice its width. E 200 kN / mm^2.

15. A hinged cast iron column of hollow circular section is 5 m long and has to carry an axial load of 500 kN. Determine the outer diameter and inner diameter of the column using a factor of safety of 3. Internal diameter to be 0·5 times the external diameter. Take f_c 550 N / mm^2 and a 1 / 1600.

16. A cast iron tube 50 mm external diameter and 40 mm internal diameter and 1·2 m long is used as pin jointed strut. Determine the crippling load by Rankine's formula. Take f_c 550 N / mm^2 and a 1 / 1600.

17. A concrete dam of trapezoidal section is 15 meters high. Its top width is 3 meters and bottom width is 8 meters. The face of the dam exposed to water is vertical and retains water up to the top level. Find the maximum and minimum intensities of pressure at the base. Specific weight of concrete is 24 kN / m^3.

18. Find the forces in each of the members of the truss shown in figure at the below :



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