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C09–C–303

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BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2016

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. Define simple bending and bending stress.

2. A circular beam of 150 mm diameter is subjected to a shear force of 10 kN. Calculate the value of maximum shear stress.

3. Draw the deflected shapes of—

(a) fixed beam;

(b) two-span continuous beam.

4. State the relation between curvature, slope and deflection of a loaded beam and explain the terms.

5. A concentrated load of 5 kN is acting at the centre of a simply supported beam of span 5 m. Determine the value of flexural rigidity of beam section if the deflection is 10 mm.

6. If the actual length of the column is 5 m, then determine the effective lengths with any three different end conditions.

7. Define :

(a) Strut

(b) Column

(c) Stanchion

8. Write the formula for acting earth pressure on a retaining wall with inclined back fill and explain the terms.

9. Define :

(a) Statically determinate frame

(b) Statically indeterminate frame

10. A solid circular shaft of diameter 30 mm is tested under torsion. The gauge length of test specimen is 300 mm. A torque of 2 kN-m produces an angular twist of 1°. Determine the modulus of rigidity of the shaft.

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 T-section of 150 mm 100 mm 15 mm is provided as a cantilever for a length of 3 m with its flange at the top carries a load *W* at its free end. What can be the maximum value of *W*, so that the stress in the section must not exceed 50 N/mm^2? Also calculate the actual stresses in tension and compression due to bending.

12. A 300 mm deep, 150 mm wide rolled steel joist of I-section with flanges 15 mm thick, web 10 mm thick is used as simply supported beam of span 4 m. Find the UDL the beam can carry without exceeding the shear stress of 40 N / mm^2.

13. Derive the formulae for the maximum slope and maximum deflection of a simply supported beam of span l with a point load W at its mid span in terms of flexural rigidity. Use double-integration method.

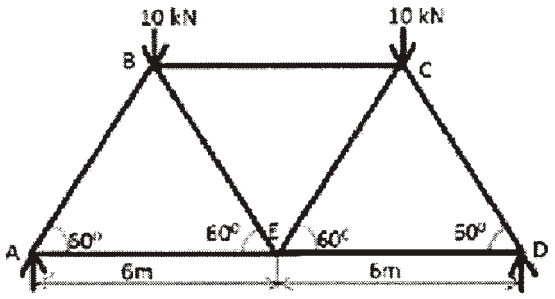
14. A simply supported beam of 8 m span carries two point loads of 20 kN each placed at a distance of 3 m from either support. Determine the maximum slope and deflection in the beam. Take EI 8 10^4 kN-m^2. Use Mohr's theorems.

15. A hollow cylindrical cast iron column is 4 m long both ends being fixed. Design the column to carry an axial load of 250 kN. Use Rankine's formula and adopt a factor of safety of 4. The internal diameter may be taken as 0·80 times the external diameter. Take f_c 550 N/mm^2 and a or (1 / 1600).

16. A cast iron hollow cylindrical column 3 m in length when hinged at both ends, has a critical buckling load of PkN. When the column is fixed at both the ends, its critical load rises to (P+300) kN. If the ratio of external diameter to internal diameter is 1·25 and E 100 kN / mm^2, determine the external diameter of the column.

17. A trapezoidal concrete dam is 2 m wide at top and 16 m high with its vertical face on water side. A free board of 2 m is to be provided. Find base width for most economical section of the dam. Take specific weight of concrete = 23 kN / m^3 and specific weight of water = 10 kN / m^3.

18. Determine the forces in the members *AB*, *AE*, *BE* and *BC* of the truss shown in figure by method of joints.



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