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C14–C–402

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BOARD DIPLOMA EXAMINATION, (C–14)

MARCH/APRIL—2016

DCE—FOURTH SEMESTER EXAMINATION

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 the following :

(a) Slenderness ratio

(b) Buckling load

(c) Flexural rigidity

2. List out any six forces acting on a dam.

3. Explain the stepwise procedure to find the stresses at the base of a trapezoidal retaining wall with vertical earth retaining face and backfill in level with the top of the wall.

4. A masonry retaining wall of trapezoidal section 7·2 m high with vertical face retaining earth at a surcharge of 20° to the horizontal. Determine the magnitude of the earth pressure acting on the wall. The unit weight of the soil is 20 kN/cu.m and angle of repose of the soil is 25°.

5. A column carries a load of 500 kN. The concrete foundation for the column is 1 5 m 1 5 m and rests on soil having an angle of repose 30°. The soil weighs 15 kN/cu.m. Determine the minimum depth of foundation required.

6. Find the prop reaction for a propped cantilever of span *L* metre and is subjected to a central point load of *W* kN. The prop is placed at the free end.

7. A beam of length 6 m fixed at both ends carries a u.d.l. of 12 kN/m on its entire span. Determine the fixed end moments and draw the bending moment diagrams.

8. State the merits and demerits of continuous beams.

9. Explain the stepwise procedure for any one method of truss analysis.

10. List out the classification of frames.

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. "The structure of Rankine's formula for column is so ingenious that it covers all cases ranging from short to very long columns." Justify this statement giving fundamental reasoning. Also obtain the Rankine's formula from basic empirical formula.

12. A cast iron hollow cylindrical column 3 m in length when hinged at both ends has a critical buckling load of *P* kN. When the column is fixed at both ends its critical load rises to (*P* 30) kN. If the ratio of external diameter to internal diameter is 1·25 and *E* 100 GPa, determine the external diameter of the column.

13. A trapezoidal masonry dam with water face vertical is 9 m high and has to store water to its full height. The dam section has a rear batter of 1 in 3. Find the top and bottom widths of the dam for no tension at the base. [Masonry weighs 22·4 kN/cu.m]

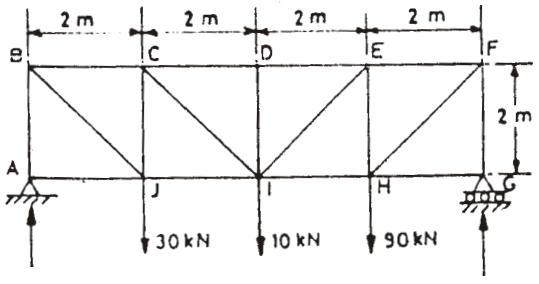
14. A retaining wall trapezoidal in section is 12 m high. The top width of the wall is 3 m with earth face having a batter of 1 in 12. If the bottom width of the wall is 8 m, find the maximum and minimum intensities of stresses developed at the base of the retaining wall. [Take weight of masonry as 22 kN/cu.m and that of earth as 18 kN/cu.m. Angle of repose of the soil is 30°]

15. Find the prop reaction and draw the shear force and bending moment diagrams for a propped cantilever of span *L* metre and is loaded with a u.d.l. of *W* kN/m on its entire span. The prop is placed at the free end and is in level with the fixed support.

16. A beam of length 8 m fixed at both ends carries a central point load of 24 kN. Determine the fixed end moments and draw the shear force and bending moment diagrams. Also find the central deflection if the cross-section of the beam is a rectangle of size 300 mm 400 mm and *E* 160 GPa.

17. A continuous beam *ABC* 14 m long is continuous over two spans *AB* 8 m and *BC* 6 m. The supports are at the same level and are simply supported. *AB* is loaded with a u.d.l. of 2 kN/m and *BC* is loaded with a u.d.l. of 4 kN/m. Find the support moments at the supports using theorem of three moments. Also sketch the shear force and bending moment diagrams.

18. Find the forces in the members *CJ*, *CD*, *CI* and *IJ* of the truss shown below using method of sections :



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