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C14–C–402

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BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2018

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. Differentiate between long column, short column and a medium column.

2. Briefly explain about any three stability conditions of a dam.

3. Write any three assumptions made in the Rankine's theory of active earth pressure.

4. A rataining wall 5 meters high with vertical back ratains soil in level with the top of the wall. Determine the magnitude and line of action of horizontal thrust per meter length of the wall. The unit weight of the soil is 20kN/cu m and angle of repose of soil is 40^0.

5. State the Rankine's formula for finding the manimum depth of foundation and explain the terms.

6. Differentiate between a statically determinate and indeterminate beam.

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

8. Define (a) Stiffness factor, (b) Distribution factor, (c) Carryover factor

9. In truss analysis, differentiate between perfect frame, deficit frame and redundant frame.

10. Mention the methods of analysis of trusses and explain any one of them in brief.

PART–B

10×5=50

Instructions : (1) Answer *any* **five** questions.
(2) Each questions carries **ten** marks.
(3) Answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. (a) State the different end conditions of long columns with the help of sketches and give the effective length in each case along with crippling loads.

(b) A rectangular column 200 mm wide and 150 mm thick is carrying a vertical load of 20 kN at an eccentricity of 50 mm in a plane bisecting the thickness. Determine the maximum and minimum intensities of stress in the section. Also sketch the stress distribution at the base.

12. A hollow cast iron column with hinged ends supports an axial load of 1000 kN. If the column is 6 m long and has an external diameter of 300 mm, find the thickness of metal required. Use Rankine's formula by taking constant a = 1/1600 and a working stress of 80 N/sq mm.

13. A trapezoidal concrete dam 10 m high has top width of 1 m and bottom width of 6 m. The face exposed to water has a slope of 1:5, with a free board of 1 m. Determine the maximum and munimum stresses and also sketch the distribution at the base of the dam. Take specific weight of concrete as 23 kN/cu m and specific weight of water as 9.81 kN/cu m.

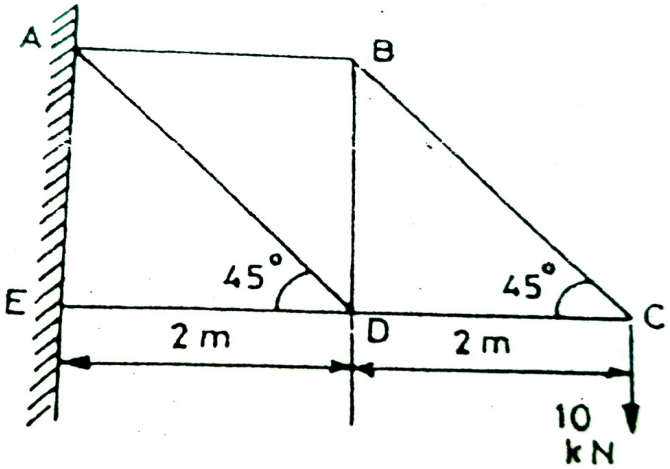
14. A masonry retaining wall of trapezoidal section is 2 m wide at top and 14 m wide at base. The height of wall is 20 m. It retains earth for its full height against its vertical face. The earth is in level with its top and is subjected to superimposed load of 18 kN/sq. m. Find the intensities of stresses at the base of the wall. Take density of masonry as 24 kN/cu m, Density of earth as 18 kN/cu m and the angle of repose of the soil is 30^0

15. Find the prop reaction and draw the shear force and bending moment diagrams for a propped cantilever of span L meters and is loaded with a central point load of W kN. The prop is placed at its free end and is in level with the fixed support.

16. A fixed beam 4 m long is subjected to a udl of 20 kN/m over the entire span. Determine the values of maximum positive and negative moments. Draw the shear force and bending moment diagrams showing the points of contraflexure and also calculate the maximum deflection. Take EI=3000 kN-m^2.

17. A continuous beam ABCD consists of 3 spans AB=6m, BC=8m and CD=4m. All the four supports are freely supported and are at the same level. Span AB carries a central point load of 12 kN, span BC carries a central point load of 10 kN and CD carries a udl of 6 kN/m. Find the support moments by the method of moment distribution and draw bending moment diagram. Assume that the beam has uniform cross section and made of the same material.

18. Find the forces in all members of the truss shown below using method of joints.



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