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C14–C–402

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BOARD DIPLOMA EXAMINATION, (C–14)
MARCH/APRIL—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. Write any two differences between long columns and short columns.

2. State the middle third rule.

3. Write the stepwise procedure to find the stresses at the base of a trapezoidal dam with vertical water face.

4. Define (i) active earth pressure and (ii) passive earth pressure.

5. Find the necessary width and depth for the foundation of a square column supporting an axial load of 5000 kN, assuming the safe bearing capacity of soil as 210 kN/m^2. The angle of repose of soil is 30° and weight of the soil as 20kN/m^3. Use Rankine's formula.

6. What is meant by degree of static indeterminacy.

7. A proposed cantilever of span *L*m propped at free end is subjected to a udl of *W* kN/m on the entire span. Find the prop reaction.

8. Write short notes on (i) carryover factor and (ii) distribution factor.

9. Distinguish between a deficit frame and a redundant frame.

10. State any three assumptions made in the analysis of frame.

PART–B

10×5=50

Instructions : (1) Answer *any* **five** questions
(2) Each questions 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 stanchion is made up of an ISLB 300 mm×150 mm with two plates 150 mm×12 mm, one at top and one at bottom flanges. If it is used as a column 4m long with both ends hinged, find the safe load using Euler's formula, with a factor of safety of 3.

For the given ISLB, I_{xx}=73.329×10^{6}mm^4, I_{yy}=3.762×10^{6}mm^4, area=4808mm^2. Take E=210 kN/mm^2. 10

12. A hollow cylindrical cast iron column is 4 m long both ends being fixed. Design the column to carry and axial load of 250 kN. Use Rankine's formula and adopt factor of safety of 4. The internal diameter may be taken as 0.8 times the external dia.

Take f_C=550N/mm^2 and α=1/1600. 10

13. A trapezoidal concrete dam 2 m wide at top and 16m high with its vertical face on water side. A free board of 2m is to be provided. Find base width for most economical section of the dam.

Take specific weight of concrete=24kN/m^3 and specific weight of water=10kN/m^3. 10

14. A masonry retaining wall of trapezoidal section is 10m high and retains soil in level with the top. The width at the top is 3m and at the bottom is 6m and the retaining face is vertical. Find the maximum and minimum intensities of stresses at the base. Density of masonry is 24kN/m^3, unit weight of soil=10kNm^3, angle of repose of the soil=30°.

Also check the stability of the wall against overturning, tension, sliding and compression, if the coefficient of friction between the wall and the soil is 0.6 and allowable compressive stress at the base is 200kN/m^2. 10

15. A cantilever beam *AB* of span 6m which is fixed at *A* and prop ped at *B*. It carries a point load of 20 kN at its mid span. Find the reaction of prop and draw SFD and BMD. Also locate the position of point of contraflexure. 10

16. A beam of span 5m has its ends fixed and carries a udl of 10kN/m run. Determine the following :

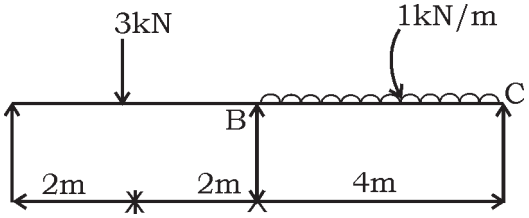
(a) The maximum bending moment.

(b) Position of point of contraflexure

(c) The maximum deflection

Draw SFD and BMD. Take E=200kN/mm^2 and I = 48×10^{6}mm^4. 10

17. A continuous beam *ABC* 8m long rests on the three supports *A, B* and *C* at the same level and is loaded as shown in the figure below. Determine the moments at the supports and draw the bending moment diagram using moment distribution method. 10



18. Find the forces in the members *CD, DE, BC, CF* and EF of the cantilever truss by method of sections. 10