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C14–C–402

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BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2017

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. Distinguish between short, medium and long columns.

2. Define the terms *(a)* surcharge and *(b)* surcharge angle.

3. What are the various types of failures of a dam?

4. Find necessary depth for the foundation of a square column supporting an axial load of 3000 kN by taking SBC of soil as 180 kN/m^2. The angle of repose is 30° and density of soil is 18 kN cum. Use Rankine's formula.

5. *(a)* Differentiate between a dam and retaining wall.

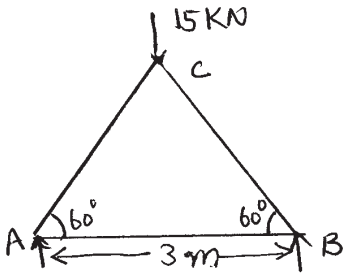
(b) Name any two forces acting on a dam.

6. State any two merits and demerits of continuous beams over simply supported beams.

7. Differentiate between statically determinate and statically indeterminate structures.

8. A fixed beam 3 m span carries a UDL of 15 kN/m over entire span. Calculate fixed end moments.

9. Find the force and nature of force in the member *AB* of following :



10. Give an example for *(a)* redundant frame and *(b)* deficient frame.

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 hollow steel tube 40 mm external diameter, 4 m long is used as a strut with both ends fixed. The tube is found to buckle when an axial load of 30 kN is applied. Find thickness of tube if $E \quad 2 \quad 10^5$ N/mm^2.

12. A short-length of tube 48 mm external diameter and 32 mm internal diameter is tested under compression. It failed under a load of 200 kN. When a 3 m length of same tube used as a strut with fixed ends, the failing load is 75 kN. From these observations calculate Rankine's constants.

13. A masonry dam 2 m wide at top and 8 m wide at bottom retains water up to full height. The water face of the dam is vertical. Calculate maximum height of the dam so that *(a)* No tension will be formed at the base and *(b)* To have a factor of safety of 2 against sliding. Density of masonry 22 and that of water is 10 kN/cum; 0·5.

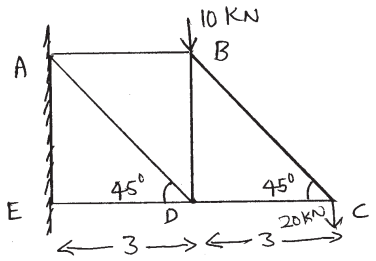
14. A masonry retaining wall 10 m height has a vertical back and retains earth upto its top level. The top width is 3 m and bottom width is 6 m. Unit weight of masonry is 22·5 kN/cum and that of earth is 15 kN/cum. Angle of repose of earth is 30°. Check the stability of the wall if the allowable pressure on the soil is 300 kN/mm^2 and coefficient of friction between soil and masonry is 0·6.

15. A horizontal cantilever 4 m long carries a u.d.l. of 5 kN/metre run on entire span. If the beam is propped at the free end to the level of fixed end, find reaction at the prop and draw SFD and BMD indicating important points. E 10 10^3 MPa. The beam has a cross-section of 150 mm wide and 200 mm deep.

16. A beam of 5 m span has its ends firmly built in, carries a central load of 50 kN. Calculate fixed end moments, draw shear force and bending moment diagrams. Also find maximum central deflection if flexural rigidity of the beam is 45 10^9 kN-mm^2.

17. A continuous beam *ABC* is simply supported at *A* and *C*. Span *AB* is of length 6 m and span *BC* is of length 5 m. Span *AB* carries a central point load of 10 kN and span *BC* carries and UDL of 3 kN/m run on entire span *BC*. Using Clapeyron's theorem of three moments, calculate support moments, draw shear force and bending moment diagrams.

18. Find the magnitude and nature of forces in all members of the truss shown below.



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