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C14–C–402

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BOARD DIPLOMA EXAMINATION, (C–14)

MARCH/APRIL—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. List the effective lengths of columns for different end conditions.

2. Define the following terms :
(a) Active earth pressure
(b) Passive earth pressure

3. Name two major forces act on a dam section with the aid of a neat sketch.

4. List the conditions for the stability of a retaining wall.

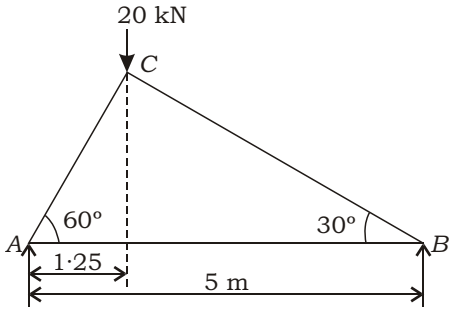
5. Define the following terms :
(a) Angle of repose
(b) Surcharge in case of retaining walls

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

7. A fixed beam 5 m span carries a central point load of 20 kN. Calculate fixed end moments.

8. State Clapeyron's theorem of three moments with usual notation.

9. Find the support reactions for the following truss with given loading :



10. Name three different methods used to find the stresses in the members of a 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 steel column 5 m long with both ends hinged has a critical buckling load of P kN. When the column is fixed at one end, hinged at other end, the critical buckling load rises to $(P \quad 250)$ kN. If the ratio of external diameter to internal diameter is 1·5, $E \quad 2 \quad 10^5$ MPa, find the dimensions of the column.

12. A cast iron column of hollow circular section 6 m long with both ends fixed, has to carry an axial load of 400 kN. Determine the section using a factor of safety 7. Internal diameter is 0·8 times external diameter. $f_c \quad 550$ N/mm^2 and $\quad 1/1600$.

13. A masonry dam 10 m height, 2 m wide at top and 6 m wide at bottom retains water with a free board of 1 m. The water face of the dam is vertical. Find maximum and minimum stresses at the base. Also show stress distribution at the base. Density of masonry 21·5 and that of water is 9·81 kN/cum.

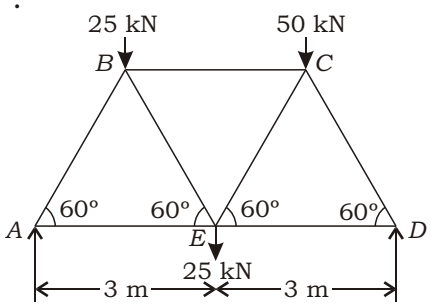
14. A masonry wall 14 m height has a vertical back and retains earth up to its top level. The top width is 3·5 m. Unit weight of masonry is 22·5 kN/cum and that of earth is 11 kN/cum. Angle of repose of earth is 30°. Calculate minimum base width required for the wall so that the stresses at the base are wholly compressive.

15. A horizontal cantilever 4 m long carries a point load of 10 kN at a distance of 1·5 m from fixed end. 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 200 mm wide and 300 mm deep.

16. A beam of 6 m span has its ends firmly built in, carries a UDL of 4 kN per metre run on entire span. Find *(a)* maximum bending moments, *(b)* maximum deflection and *(c)* position of point of contraflexures. Draw shear force and bending moment diagrams. Take EI 50 10^9 kN-mm^2.

17. A continuous beam ABC is simply supported at A and C. Span AB is of length 5 m and span BC is of length 4 m. Span AB carries a central point load of 10 kN and span BC carries a point load of 8 kN at 1 m from support C. 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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