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C16–C–402

# 5615

## BOARD DIPLOMA EXAMINATION, (C–16)

## 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.** State the conditions of stability of dam.

**2.** A dam 5 m high and 1 m top width has a vertical water face. Find the bottom width of the trapezoidal dam for no tension to develop at the base. Take weight of masonry = 20 kN/$m^3$. Assume water level is up to top of dam.

**3.** Explain the terms *(a)* active earth pressure and *(b)* passive earth pressure.

**4.** Using Rankine's formula, find the necessary depth of foundation of a column supporting an axial load of 4000 kN assuming safe bearing capacity of soil as 150 kN/$m^2$. The angle of repose of soil is 30° and sp. weight of soil is 20 kN/$m^3$.

**5.** Differentiate between a statically determinate beam and a statically indeterminate beam.

6. State the merits and demerits of fixed beams over simply supported beams.

7. Define stiffness factor. Give the stiffness factor for a beam *(a)* simply supported at both the ends and *(b)* fixed at one end and freely supported at the other end.

8. Differentiate between a perfect frame and an imperfect frame showing examples.

9. List the methods used to analyze a perfect frame.

10. Write any three important points to be followed in the analysis of determinate 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. A trapezoidal masonry dam is 10 m high, retains water to a height of 9 m and the water face has a batter of 1 H to 5 V. The top width is 2 m and bottom width 8 m. Sketch the distribution of stresses at the base of the dam. The specific weight of masonry is 20 kN/m$^3$. Take specific weight of water as 10 kN/m$^3$.

12. A masonry dam 8 m high retains water to a height of 6 m, the water face being vertical. The width at top is 2 m and at bottom is 4 m. Examine the stability of the dam taking coefficient of friction as 0·5 and maximum allowable compressive stress of masonry as 200 kN/m$^2$.

13. A trapezoidal masonry retaining wall 1·5 m wide at top and 4 m wide at bottom is 6 m high. The vertical face retains earth at a surcharge of 20° with the top of the wall. Determine the maximum and minimum intensities of stress at the base of the wall. Take the specific weight of masonry as 24 kN/m$^3$ and the specific weight of earth as 18 kN/m$^3$.

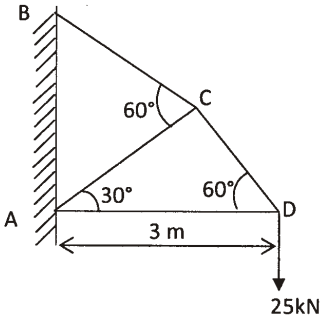
**14.** A horizontal cantilever beam 6 m long carries a UDL of 10 kN/m over a length of 2 m from the fixed end. The cantilever is propped at the free end to the level of fixed end. Determine the reaction at the prop. Draw SFD and BMD and locate the point of contraflexure.

**15.** A fixed beam of span 6 m carries two point loads of 200 kN each at 2 m from each end. Find the fixed end moments. Draw SFD and BMD and locate the point of contraflexure.

**16.** A continuous beam *ABCD* of uniform section 12 m long is simply supported at *A*, *B* and *C* such that *AB* 6 m, *BC* 4 m and the overhang *CD* 2 m. Span *AB* carries a UDL of 20 kN/m, span *BC* carries a central point load of 40 kN and the overhang *CD* carries a UDL of 10 kN/m. Determine the support moments, support reactions and also draw SFD and BMD.

**17.** A continuous beam is fixed at *A* and simply supported at *B* and *C* such that span *AB* 6 m and span *BC* 3 m. Span *AB* carries a UDL of 12 kN/m and span *BC* carries a point load of 80 kN at 1 m from support *C*. Find the support moments by moment distribution method and draw BMD. *EI* is constant for the beam.

**18.** Find the forces in the members of the cantilever truss shown in the figure below :

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