4425

BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2016

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. Define the following terms :

   (a) Slenderness ratio

   (b) Equivalent length of a column

2. Define the following terms :

   (a) Active earth pressure

   (b) Passive earth pressure

   (c) Angle of repose

3. Mention any three stability conditions for a dam.

4. Explain in brief the term 'most economical dam section'.

5. State Rankine's formula for minimum depth of foundation with usual notation.

6. What are the various conditions to be satisfied to consider a beam as a statically determinants beam?

7. Two identical beams of same material, span carries same central point load. Among the two, one has simply supported ends and the other has fixed ends, find the ratio of maximum deflections between them.

8. Define the term 'stiffness factor' and give its value for a beam with one end fixed, other simply supported.

9. Write a short note on classification of frames.

10. Write the assumptions made in the analysis of frames.

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PART—B   10×5=50

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Instructions : (1) Answer *any* **five** questions.

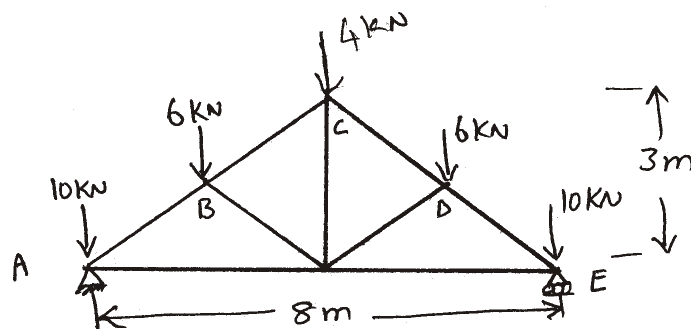(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. A hollow cast iron column of 250 mm external diameter, 20 mm thickness is 5 m long is used as a strut with both ends fixed. Calculate the ratio of Euler's to Rankine's safe loads using a factor of safety 4. Given, E 100 kN/mm^2, f_c 550 N/mm^2, 1/1600.

12. In a compression test for a 20 mm dia pin-ended strut, the following results are obtained :

Length	Crippling Load
200 mm	40 kN
350 mm	30 kN

From these observations, calculate two Rankine's constants.

13. A horizontal masonry dam 10 m high retains water on its vertical face with a free board of 1 m. If the top width of the dam is 1 m, find the minimum base width required to avoid tension at the base. Density of masonry is 21·5 and that of water is 10 kN/cum.

14. A concrete retaining wall of 6 m height has a vertical back and retains earth up to its top level. The top width is 2 m and bottom width is 3·5 m. Unit weight of concrete is 24 kN/cum and that of earth is 16 kN/cum. Angle of repose of earth is 40°. Check the stability of the wall if the allowable pressure on the soil is 200 kN/mm^2 and coefficient of friction between soil and concrete is 0·6.

15. A horizontal cantilever 6 m long carries a point load of 20 kN at 2 m from free 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. Take E 2 10^5 MPa. The beam has a cross section of 100 mm wide and 200 mm deep.

16. A fixed beam of 3 m length carries two point loads of 500 kN each at 1 m from each end. Find fixed-end moments and draw shear force and bending moment diagrams.

17. A continuous beam *ABC* consisting of two spans *AB* 5 m; *BC* 4 m; the support *A* is fixed and supports *B* and *C* are simply supported. The span *AB* carries a UDL of 10 kN/m while span *BC* carries a central point load of 20 kN. Find support moments using moment distribution method and draw bending moment diagram. Flexural rigidity is uniform.

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

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