3219

BOARD DIPLOMA EXAMINATION, (C-09)

OCT / NOV-2015

DCE - THIRD SEMESTER EXAMINATION

STRENGTH OF MATERIALS AND THEORY OF STRUCTURES

Time : 3 hours]   [*Total Marks* : 80

PART - A   3 X 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 the general equation for shear stress distribution over a given section and explain the terms.

2. Define modulus of section and obtain the formula for the same of a hollow rectangular section of external and internal dimensions as (B x D) and (b x d).

3. Obtain the degree of redundancy of a 2 span continuous beam with fixed supports at ends subjected to vertical loading.

4. A concentrated load of 5 kN is acting at the centre of simply supported beam of span 5 m. Determine the value of flexural rigidity of beam section if the deflection is 10 mm.

5. State the Mohr's theorems.

6. Define the following :
   (a) Strut
   (b) Column
   (c) Stanchion

7. State the equation for Rankine's crippling load and explain the terms.

8. Write the formula for active earth pressure on a retaining wall with inclined back fill and explain the terms.

9. Name the various methods which are employed in finding out the forces in a frame.

10. Determine the polar moment of inertia of a hollow circular shaft of external diameter 20 mm and internal diameter 10 mm.

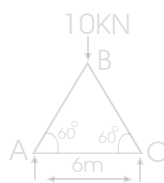**PART - B**   10 X 5 = 50

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

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

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

11. The cross section of a cast iron beam is an I-section with top flange 150 mm x 50 mm, web 40 mm x 220 mm and bottom flange 250 mm x 80 mm, the loading being in the plane of the web. The upper portion of the section is in compression. If the allowable maximum stresses are 60 N/mm^2 in tension and 150 N/mm^2 in compression, find the moment of resistance of the section.

12. A simply supported wooden beam of 1.2 m span and rectangular cross section 150 mm wide and 250 mm deep carries a concentrated load 'p' at its mid section. Allowable working stresses in bending and shear are 7 N/mm^2 and 1.1N/mm^2 respectively. What is the safe value of the concentrated load 'p'?

13. A cantilever beam 3 m long carries a u.d.l. of 10 kN/m run over a length of 2 m from fixed end and a point load of 5 kN at free end. Calculate the maximum slope and deflection. Take $E = 200$ kN/mm^2 and moment of inertia $I = 8600$ x 10^4 mm^4.

14. Determine the maximum slope and maximum deflection for a simply supported beam of span 5 m subjected to a u.d.l. of 10 kN/m over the entire span and central point load of 20 kN. Take $E=200$ x 10^3 N/mm^2 and moment of inertia $I=75$ x 10^6 mm^4.

15. For what length of a hollow steel bar of 40 mm external diameter and 30 mm internal diameter used as a strut? The Euler's theory is applicable for buckling if ultimate compressive strength is 0.33 kN/mm^2,

(a) whant both the ends are fixed;

(b) one end is fixed, other end is free.

16. A column l m long has an area of cross section of 900 mm^2. Find the slenderness ratio if the section is —

(a) circular;

(b) square;

(c) rectangular with depth twice the width.

State which of the column is strongest.

* 17. A trapezoidal concrete dam is 2 m wide at top and 16 m high with its vertical face on water side. A free board of 2 m is to be provided. Find base width for most economical section of the dam. Take specific weight of concrete=23 kN/m^3 and specific weight of water = 10 kN/m^3.

18. Determine the forces in all the members of the truss shown in the figure by method of joints :

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