3219

BOARD DIPLOMA EXAMINATION, (C-09)

MARCH/APRIL - 2019

DIPLOMA IN CIVIL ENGINEERING

STRENGTH OF MATERIALS & THEORY OF STRUCTURES

THIRD SEMESTER EXAMINATION

Time: 3 Hours **Total Marks: 80**

PART - A (10 x 3 = 30 Marks)

Note 1:Answer all questions and each question carries 3 marks

2:Answers should be brief and straight to the point and shall not exceed 5 simple sentences

1. A rectangular beam 100mm wide is subjected to a maximum shear force of 50kN. Find the depth of beam if the maximum shear stress is 3 N/mm^2.
2. Write the formula for the maximum shear stress at Neutral axis of a circular section of diameter D and hence obtain the ratio between maximum shear stress to average shear stress.
3. Write any three salient features of Macaulay's method of determining slope and deflection of beams.
4. A concentrated load of 5kN is acting at the centre of a simply supported beam of span 5m. Determine the value of flexural rigidity of beam section if the deflection is 10mm.
5. State the Mohr's theorems.
6. If the actual length of the column is 5m, determine the effective lengths with any three different end conditions.
7. In the case of columns , define
   (a) Actual Length
   (b) Safe load
8. List any three failures of a retaining wall
9. Define a truss or frame and draw a simple frame.
10. Define polar moment of inertia and state its units.

PART - B (5 x 10 = 50 Marks)

Note 1:Answer any five questions and each question carries 10 marks

2:The answers should be comprehensive and the criteria for valuation is the content but not the length of the answer

11. A T section of 150mm x 100mm x 15mm is provided as a cantilever for a length of 3m with its flange at the top carries a load W at its free end. What can be the maximum value of W, so that the stress in the section must not exceed $50N/mm^2$? Also calculate the actual stresses in tension and compression due to bending.
12. A Cantilever beam of symmetrical section 300mm deep and I=12 x 10^7 mm^4 carries a u.d.l of 16kN/m. Calculate the maximum span of the beam, if the maximum bending stress is not to exceed 160 N/mm^2 with this span. Calculate the maximum central point load if the bending stress is not to exceed the limit given above
13. A cantilever beam AB of span 4m which is fixed at A and propped at B. It carries a point load of 10kN at its mid span. Find the reaction of the prop and draw SFD and BMD showing the values at salient points.

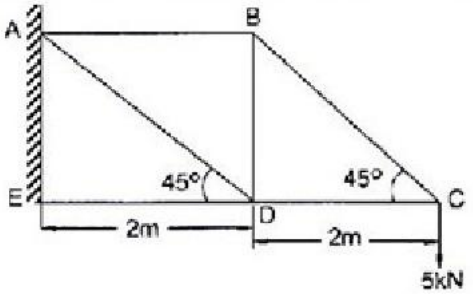
14. A cantilever 6m span carries two point loads of each 20kN at 2m and 4m from free end. Find the maximum slope and deflection if EI=8400kN-m^2

15. A 325 x 165 mm R.S.J is used as a strut 6m long, one end is fixed and the other is hinged. Compute the crippling load by Rankine's formula. Compare this with the load applied by Euler's formula. For what length of this strut with the two formulae gives the same crippling load. For the joist:
    Area of C.S=5490 mm^2
    I_{xx}= 98.746 x $10^6 mm^4$ I_{yy}=5.108 x 10^6 mm^4
    E for strut=210kN/mm^2 f_c=0.33kN/mm^2; a=1/7500

16. A hollow cylindrical cast iron column is 4m long both ends being fixed. Design the column to carry an axial load of 250kN. Use Rankine's formula and adopt a factor of safety of 4. The internal diameter may be taken as 0.80 times the external diameter. Take f_c=550N/mm^2 and 'a' or 'α'=(1/1600).

17. A trapezoidal masonry dam 5m high, 1m wide at its top and 3m wide at its bottom retains water on its vertical face. What are the maximum and minimum stresses at the base when the reservoir is empty? Take ω_m=22kN/m^3 and ω_w=9.81kN/m^3.

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



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