

3016
BOARD DIPLOMA EXAMINATION, (C-09)
MARCH/APRIL - 2019
*** DIPLOMA IN CIVIL ENGINEERING**
ENGINEERING MECHANICS
FIRST YEAR 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. Write the characteristics of a force.
2. List any three properties of a couple.
3. Give the position of Centroid of the following section.
 - a. Rectangle
 - b. Triangle
 - c. Semi circle
4. A hollow circular section has an external diameter of 80mm and internal diameter of 60mm. Find its moment of inertia about the horizontal axis passing through its centre.
5. Define a) Strain energy b) Resilience
6. a) Define i) Young's Modulus,
 ii) Bulk modulus
7. Define a) Modular Ratio b) Poisson's Ratio
8. Draw the sketches of
 - a) Cantilever beam with point load W at mid span
 - b) Simply supported beam with UDL w/m run
 - c) Fixed beam with central point load.
9. A simply supported beam of span 6 m carries a UDL of 10 kN/m over its entire length. Draw the BM diagram.
- * 10. A beam of 9 m length simply supported at the right end and at 6 m from the right end. It carries a UDL of 8 kN/m over the supported length and a concentrated load of 24 kN at the extreme left end. Determine the support reactions.

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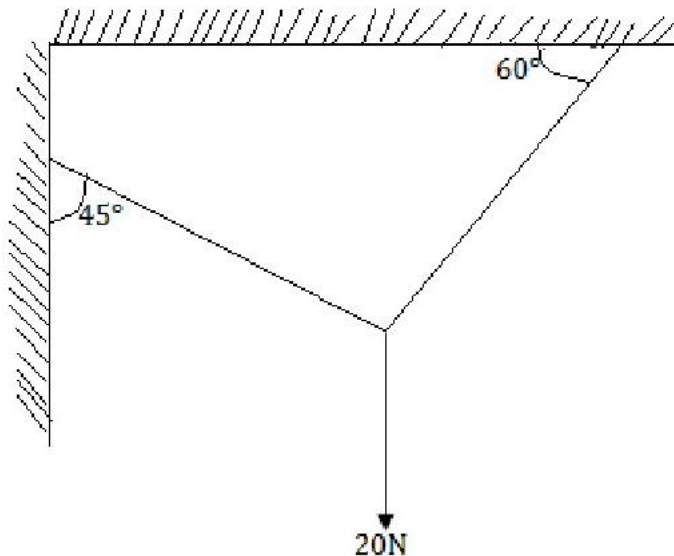
PART - B (5 x 10 = 50 Marks)

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

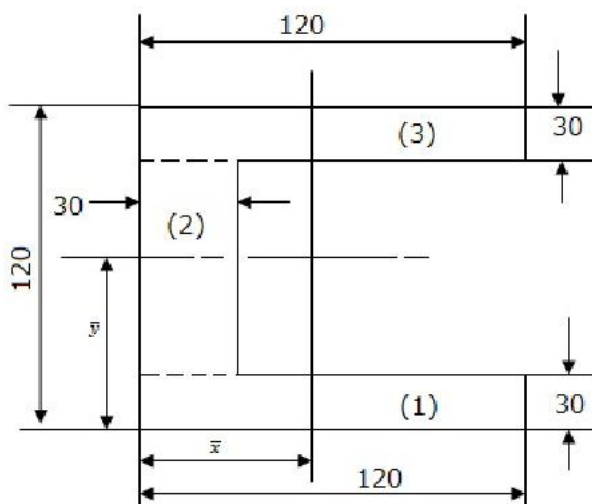
2: The answers should be comprehensive and the criteria for valuation is the content but not the length of the answer

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11. a) With the help of a sketch, state 'Parallelogram law of forces'. 4M
 b) An electric light fixture weighing 20N hangs from a point B, by two strings AB and BC shown in fig. Using Lami's theorem, determine the forces in the string AB and BC. 6M



12. Find the position of centroid of a channel from base and left edge.



13. A built-up section consists of two channels ISLC300 placed back to back at 100mm clear distance with two cover plates 300x20mm, one on each flange. Determine the moments of inertia of the section about horizontal and vertical centroidal axes. For a single channel $I_{xx}=6.05 \times 10^6 \text{ mm}^4$; $I_{yy}= 3.46 \times 10^6 \text{ mm}^4$; $C_{yy} = 25.5 \text{ mm}$
14. A steel bar 50 mm diameter is completely encased in a brass tube of 80 mm outside diameter. The length of the composite bar is 400 mm. If this assembly is subjected to a compressive force of 80 kN, Determine.
- Stresses in steel bar and brass tube
 - Change in length of the assembly
- Given E for steel = 208 kN/mm² and E for brass = 104 kN/mm². Also find the load shared by each material.

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15. The following results were obtained from tensile test on a mild steel specimen.

Diameter of the specimen = 50 mm

Gauge length = 250 mm

Length of specimen at failure = 300 mm

Extension at a load of 42.5 kN = 444×10^{-4} mm

Load at yield point = 162.20 kN

Maximum load = 250 kN

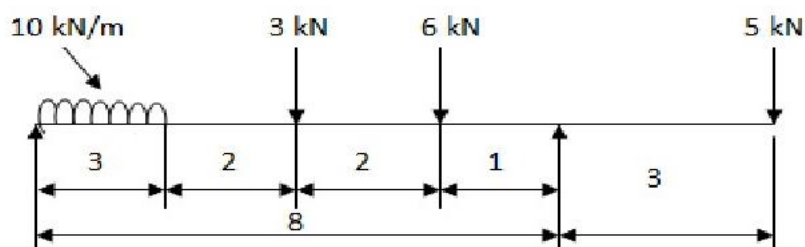
Diameter of neck = 30 mm

Factor of safety = 3

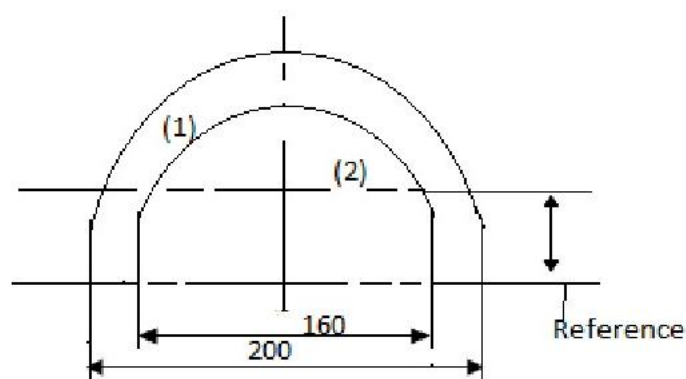
Calculate

- Young's modulus
- Stress at yield point
- Ultimate stress
- Working stress
- Percentage of elongation
- Percentage of reduction in area.

16. Draw S.F and B.M diagrams by indicating values at salient points.



17. a) A simply supported beam of span 6 m carries a UDL of 4 kN/m over its right half of the span. Draw S.F and B.M diagram.
 b) A cantilever of 4 m span carries a UDL of 10 kN/m over 2 m from right end and a point load of 15 kN at 1 m from left end. Draw SFD & BMD.
- 18A. Find the C.G. of a semicircular section from the base having outer and inner diameters of 200mm and 600 mm respectively as shown in fig. All dimensions are in mm.



- B. A Circular area of diameter 'd' has moment of inertia equal to I_{xx} of a square of side 120mm. Compute the diameter of circular area.

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