



c09-c-106

3016

BOARD DIPLOMA EXAMINATION, (C-09)

MARCH/APRIL—2016

DCE—FIRST YEAR EXAMINATION

ENGINEERING MECHANICS

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. Write the characteristics of force.
2. List any three properties of a couple.
3. State the formulae for \bar{x} and \bar{y} for any section, i.e., centroid.
4. Write the practical applications of determination of moment of inertia.
5. Define (a) strain energy and (b) resilience.
6. Define (a) modular ratio and (b) Young's modulus.
7. A steel rod 20 mm in diameter and 500 mm long is subjected to an axial pull of 30 kN. Determine (a) the intensity of stress and (b) the strain. Take $E = 2 \times 10^5 \text{ N/mm}^2$.
8. Draw the sketches of (a) continuous beam, (b) cantilever beam and (c) simply supported beam.

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9. A simply supported beam of span 6 m carries a central point load of 20 kN in addition to the UDL of 5 kN/m over its entire span. Draw the SF diagram.
10. Draw the sketches of (a) roller support, (b) hinged support and (c) fixed support showing the reactions.

PART—B

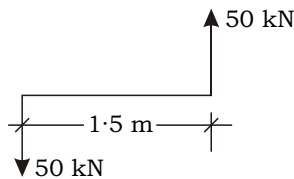
10×5=50

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

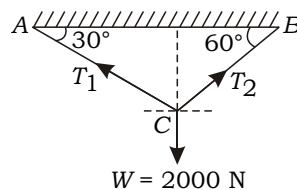
(2) Each question carries **ten** marks.

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

11. (a) For the couple shown below, find the moment. Also give the stabilizing moment for the given couple :

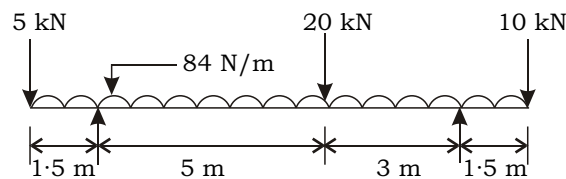


- (b) A weight of 2000 N is supported by two chains AC and BC as shown in the figure below. Determine the tension in each chain :



12. Determine the position of the centroid of a composite section with a plate of 100 mm width and 40 mm thickness welded to the top flange. Area of I-section is 1021 m^2 . Take top of plate as reference.
13. (a) What do you mean by polar moment of inertia of a section?
 (b) Determine the moment of inertia of a circular section of 100 mm diameter about its centroidal axes by using parallel axes theorem.

14. (a) Define the three elastic constants.
- (b) In a tensile test on a steel tube of external diameter 18 mm, 12 mm bore, an axial load of 1.7 kN produced an elongation of 0.0045 mm in a length of 75 mm, while the outer diameter suffered a compression of 0.0032 mm. Calculate the values of Poisson's ratio, Young's modulus E and shear modulus G .
15. Find the final dimensions of a steel flat of original length 400 mm, width 200 mm and thickness 8 mm, subjected to an axial pull of 160 kN. Take E for steel as 200 kN/mm^2 and Poisson's ratio as 0.3.
16. A beam of 8 m length is simply supported at its ends and carries two point loads of 20 kN and 30 kN at 2 m and 5 m from RHS. It also carries a UDL of 2.5 kN/m throughout. Draw SF and BM diagrams for the beam, giving the location and magnitude of max. BM.
17. Draw the SF and BM diagrams for the beam shown below :



18. (a) Find the centroid of an inverted T-section from bottom with flange 60×10 and web 50×10 .
- (b) The moment of inertia of a triangular lamina about its base is $162 \times 10^6 \text{ mm}^4$. Find MI of this triangle about an axis parallel to its base and passing through the centroid.
