6022

C16–C–106

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BOARD DIPLOMA EXAMINATION, (C-16)

OCT/NOV—2018

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. Define the terms :

(a) Force

(b) Moment

(c) Resultant

2. Differentiate between Centriod and centre of gravity.

3. Determine the height and base of a right angle triangle with one side vertical whose centriod values are 20 mm from the base and 60 mm from the vertical face.

4. The moment of inertia of a square about its base is 900 mm^4. Find the values of I_{xx}, I_{yy} and I_{zz} for the square.

5. Define the terms

(a) Poisson's ratio

(b) Modulus of elasticity

(c) Resilience.

6. A hollow steel tube 3.5 m long has external diameter of 120 mm. In order to find the internal diameter the tube was subjected to a tensile load of 400 kN and ectension was measured to be 2 mm. If the modulus of elasticity for the tube material is 200 GPa, determine the internal diameter of the tube.

7. A wooden wheel of 2000 mm diameter is to be fitted with a steel ring of 1990 mm internal diameter. Determine (a) Stress developed in steel and (b) Minimum temperature required to fit the steel ring over wooden wheel. Take Young's modulus of steel as 2×10^5 N/ mm^2 and Co-efficient of thermal expansion as $12 \times 10^{-6}/^0C$.

8. Draw the sketches of beams (a) Centilever beam (b) Simply supported beam (c) Overhanging beam.

9. Determine the magnitude of the point load for the bending moment 20 kN.m of a cantilever beam of span 6m, when the point load has applies at 4m from fixed end.

10. A simply supported beam of length L meters long carries a point load w at a distance of 'a' from the left hand support and 'b' from right hand support. So that (a+b) = L. Draw the sketch of loaded beam and State the values for reactions.

PART–B 10×5=50

Instructions : (1) Answer *any* **five** questions.
(2) Each questions carries **ten** marks.
(3) Answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. Five forces 20N, 30N, 40N, 50N and 60N are acting on one of the angular points of a regular hexagon towards the other five angular point taken in order. Find the magnitude and direction of the resultant force.

12. Determine the position of the centroid of a Chennel section with top flange - 100×30mm, web - 30 × 200mm and bottom flange - 250 × 30mm.

13. Determine the moment of inertia and radius of gyration for a T - section with top flagne - 300mm × 10 mm and web - 200 mm × 100 mm.

14. Determine the moment of inertia about the centroidal axes for a built - up section having four equal angle sections forming a box of size 180 mm. The single angle section is 90 mm × 90mm × 10mm. The properties of angle section A= 1047 mm^2; Ixx = Iyy = 8.1 × 10^5 mm^4, $C_{xx} = C_{yy}$ = 24.2 mm.

15. Two bars A and B are made of the same meterial and of the same length 1.2 meters are subjected to same axial load. Area of cross section of bar A is 600 mm^2 for part of its lenght and 900 mm^2 for the remaining length. Bar B is of cross section 300 mm^2 throughout. If the elongation of bar A is 42% of the elongation of bar B, what length of bar A is area 600mm^2?

16. A copper rod 30 mm diameter is enclosed within a steel tube of 35 mm diameter and 40 mm external diameter. The ends of the rod and tube are rigidly connected together. If the composite section is heated through 80°C, What stress will develop in each ? Take $\alpha_s = 6\times10^{-6/0}C$; E_s = 200GPa; $\alpha_C = 10\times10^{-6/0}C$ and E_c = 120GPa.

17. A. simply supported beam AB of length 10 m carries concentrated loads of 10kN, 40kN, 20kN and 30kN at points C,D,E and F respectively. AC= CD=DE=EF=FB = 2m. Draw the shear force and bending moment diagrams showing the values at silent points also show the position and magnitude of maximum bending moment.

18. A beam of length 8m is supported at distance of one meter and 6 meters from left end of the beam. The beam cerries a uniformly distributed load of 2kN/m over the left half of its length and the point laods of 4kN, 6kN and 8kN at distances of 2m, 4m and 7m fromthe left hand support the beam. Draw shear force and bending moment diagram showing values at all silent points.

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