



C-16-C-105

# 5016-A

## BOARD DIPLOMA SUPPLEMENTARY (INSTANT) EXAMINATION, (C-16)

JUNE - 2019

### DCE - FIRST YEAR EXAMINATION ENGINEERING MECHANICS

Time : 3 Hours]

[Total Marks : 80

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#### PART - A

2×15=30

- Instructions :**
- (1) Answer any 15 questions.
  - (2) Each question carries 2 marks.
  - (3) Answer should be brief and straight to the point and shall not exceed five simple sentences.

- 1 Define Engineering Mechanics. 2
- 2 Define fundamental units and derived units with examples. 1+1
- 3 State the Parallelogram law of forces with neat sketches. 1+1
- 4 State the conditions for Equilibrium of a rigid body subjected to a system of co-planar forces. 2
- 5 Write any 4 properties of couple. 1/2×4=2

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[ Contd...

- 6 Two forces 100N and 80N Act at a point making an angle of  $60^\circ$  between them. Determine their resultant. The 100N force is horizontal. 2
- 7 Define the centroid. 2
- 8 Locate the position of centroid of the following figures with a neat sketch : 2
- (a) Triangle
- (b) Semi circle
- 9 What is meant by Axis of symmetry ? 2
- 10 State Parallel axis theorem. 2
- 11 Find the M.I. of an hollow circular section whose external dia is 60 mm and internal dia is 50 mm about centroidal axis. 2
- 12 Find the radius of gyration of a circle having diameter 'd'. 2
- 13 Define polar moment of Inertia of a plane area. 2
- 14 Calculate polar M.I. of an hollow circular section, whose external diameter is 60 mm and internal diameter is 50 mm. 2
- 15 Define : 1+1
- (a) Stress
- (b) Strain.

- 16 Define proof stress. 2
- 17 State Hooke's Law. 2
- 18 Define Malleability. 2
- 19 Define creep. 2
- 20 The bulk modulus of a material is 125 GPa and Young's modulus is 200 GPa. What is its Poisson's ratio ? 2

**PART - B****10×5=50**

- Instructions :**
- (1) Answer any **FIVE** questions.
  - (2) Each question carries **TEN** marks.
  - (3) Answer should be comprehensive and criterion for valuation is the content but not the length of the answer.

- 21 Four men pull a tree in the East, South East, South West and North West directions with forces 200N, 300N, 150N and 350N respectively. Find the resultant force and its direction. **2+6+2=10**

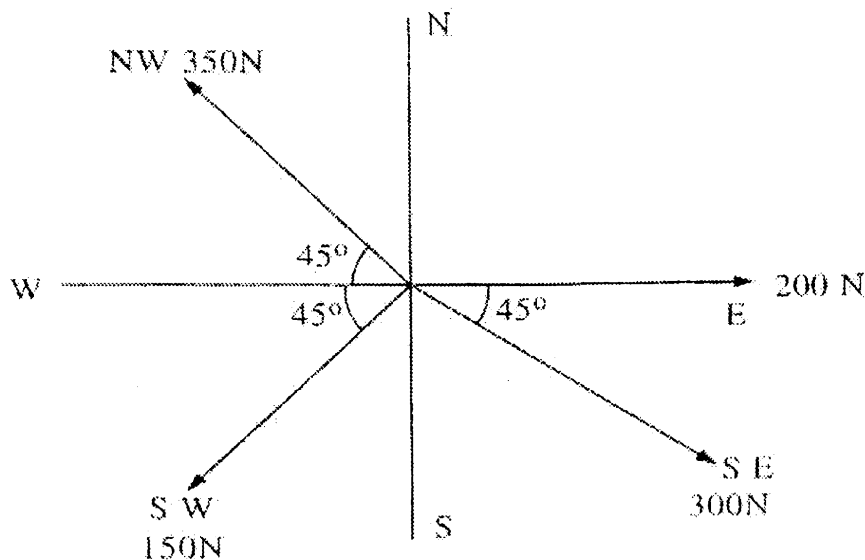
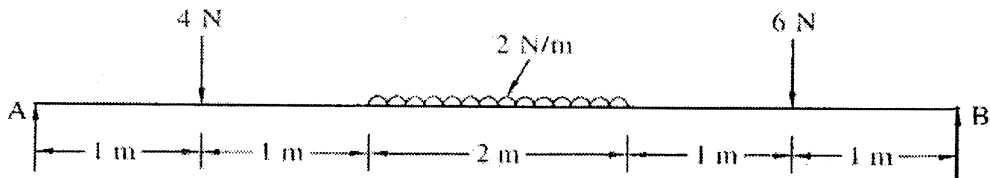


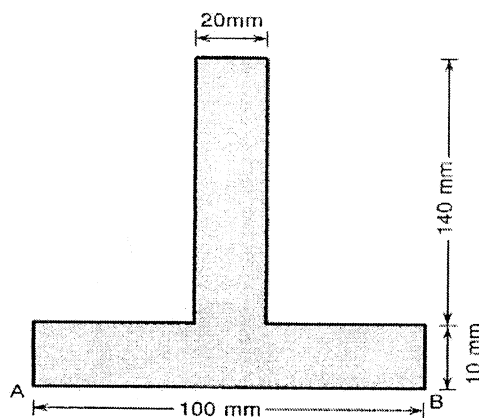
FIGURE (a)

- 22 Find the support reactions for the following SS beam. 10



FIGURE

- 23 Find the centroid for the following section. 10



FIGURE

- 24 Determine the moments of Inertia and radius of gyration 10  
for the I-section about the horizontal and vertical centroidal  
axes details given below :

Top Flange – 120 × 10, Web – 180 × 10,

Bottom flange – 120 × 10. All dimensions are in mm.

**25** Determine  $I_{xx}$  and  $I_{yy}$  for the channel section **5+5**  
with its web vertical, given overall dimensions as  
400 mm × 100 mm. Thickness of flanges = 15 mm  
and thickness of web = 8 mm.

**26** Draw Stress-Strain diagram for a mild steel specimen **5+5**  
subjected to a tensile force and explain all salient points.

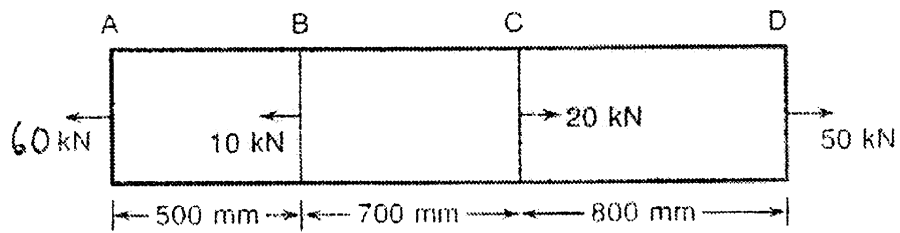
**27** The following results were obtained from tensile test **5×2=10**  
on a mild steel specimen.

Dia of specimen	= 45 mm
Gauge length	= 250 mm
Length of specimen	= 300 mm
Extension at load of 42.5 kN	= $444 \times 10^{-4}$ mm
Load at yield point	= 162.2 kN
Max load	= 250 kN
Dia of neck	= 36 mm
Factor of safety	= (FS) = 3

Calculate :

- (a) Young's Modulus
- (b) Stress at yield point
- (c) % of elongation
- (d) % of reduction in area
- (e) Ultimate stress

- 28 A steel bar 25 mm diameter is acted upon by forces 3+7  
as shown in figure. Find the total elongation in the  
bar  $E = 2 \times 10^5 \text{ N/mm}^2$ .



FIGURE