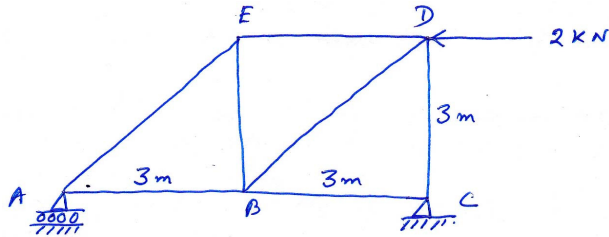
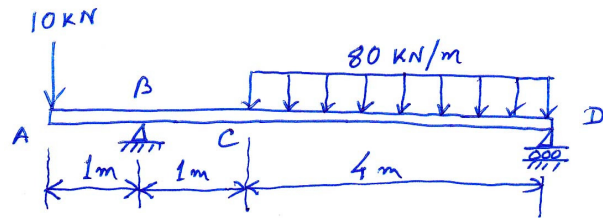


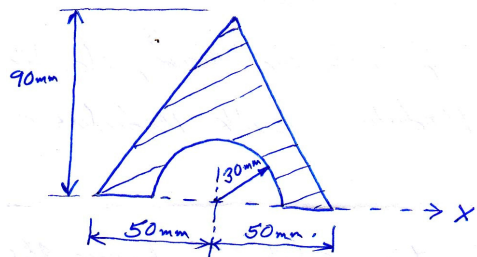
Q-6. Calculate the force in each member of the loaded truss. (20)



Q-7. Draw the shear force and Bending moment of the loaded beam shown below. (20)



Q-8. Find out the moment of inertia of the figure shown below about x-axis. (20)



Roll No.

Lingaya's University, Faridabad
B.Tech (Term – II)
Examination – January, 2010
Engineering Mechanics
Paper: ME-101

Time; 3 Hours]

[Max. Marks: 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after the examination.

Note: All questions carry equal marks. Attempt five questions in all. Question 1 is compulsory. Select two questions from Section B & Two from Section C. Neat sketches must accompany the solutions. See figures for section A in Page 3.

Section – A

Q-I Part –A

Select the correct answer-Multiple choice

(1x10)

- (i) The resultant of two forces 200N & 100N at 135° is
 - (a) 300N (b) 100N (c) 250N (d) none of these
- (ii) Determine the resultant couple acting on triangular plate (Fig. A1)
 - (a) 1300Ncm (b) 650 Ncm (c) 2600Ncm (d) none of these
- (iii) Force on cable AB is (Fig. A2)
 - (a) 141.42 (b) 200 N (c) 282.84 (d) none of these
- (iv) Vector product $2 \mathbf{i} \times 5 \mathbf{j} = ?$
 - (a) 10k (b) 10i (c) 10j (d) 0
- (v) Moment of force 100N about point 'O' = ? (Fig. A3)
 - (a) 20Nm cw (b) 40 Nm cw (c) 60 Nm cw (d) 80 Nm cw
- (vi) The resultant force of distributed load is (fig. A4)
 - (a) 300 N (b) 150 N (c) 33.3 N (d) none of these
- (vii) The resultant force is acting at a distance from O (Fig. A5)
 - (a) 2m (b) 1m (c) 1.5 m (d) none of these
- (viii) This is a two-force member (Fig. A6)
 - (a) yes (b) No

(ix) The (x,y,z) direction cosines of vector are the cosines of angles that the vector makes with (x,y,z)

- (a) yes (b) no

(x) Centroid of quarter circle of radius 'r' in third quadrant is

- (a) $4r/3n, 4r/3n$ (b) $-4r/3n, -4r/3n$ (c) $-4r/3n, 4r/3n$ (d) none of these

(xi) I_{xy} of rectangle of base 'b', height 'h' w.r. to centroidal axes

- (a) $1/12 bh^3$ (b) $1/3 bh^3$ (c) $1/24 b^2h^2$ (d) none of these

(xii) centroid of right half circular ring of radius 'R' is

- (a) $2R/\eta, 2R/\eta$ (b) $\frac{2R}{\eta}, 0$ (c) $0, -2R/\eta$ (d) none of these

(xiii) The MOI of circle of radius 'r' about center is

- (a) $\frac{\pi r^4}{4}$ (b) $\frac{\pi r^4}{2}$ (c) πr^4 (d) none of these

(xiv) The unit of Shear strain is

- (a) N/mm^2 (b) mm/m (c) radian/radian (d) none of these

(xv) The unit of poisson's ratio is

- (a) N. mm (b) N/mm (c) mm/mm (d) none of these

(xvi) A beam is usually loaded by forces that are transverse to its axes.

- (a) true (b) false

(xvii) At a given instant blocks A & B have motion as shown in Fig. A-7. Velocity of B with respect to A is

- (a) 5m/sec. (b) 1m/s (c) -5m/s (d) none of these

(xviii) A couple is a

- (a) free vector (b) fixed vector

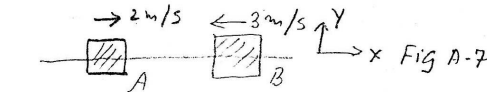
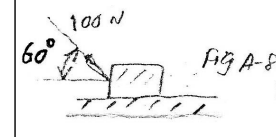
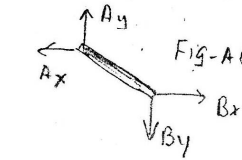
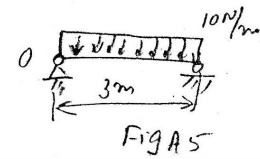
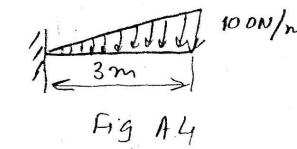
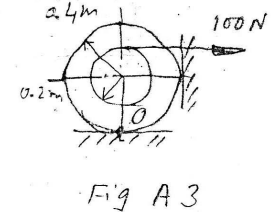
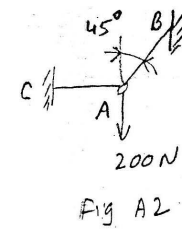
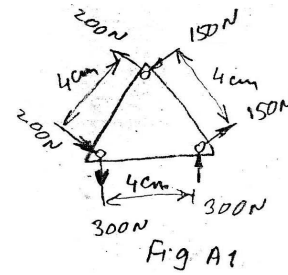
(xix) A 10 kg block rests on smooth surface. Block's acceleration is: Fig. A-8.

- (a) $0m/s^2$ (b) $2m/s^2$ (c) $5m/s^2$ (d) none of these

(xx) $(-2i + 3k + 7j) + (-2i - 3k + 7j)$ equals. (1x20=20)

- (a) 0 (b) $-4i + i4j + bk$ (c) $0i + 6k + 0$ (d) none of these

Section A (Figures)



Section - B

Q-2. Derive the torsion formula relating torque, angle of twist and maximum shear stress produced. (20)

Q-3. Derive the relationship between the elastic constants Young's modulus, Bulk modulus and Modulus of rigidity. (20)

Q-4. Define moment of Inertia. State and prove the theorems of moment of inertia. (20)

Section - C

Q-5. Force F is directed from A to B. The magnitude of moment of F about line CD is 50 N-m, determine the magnitude of F. (Fig. C-1) (20)