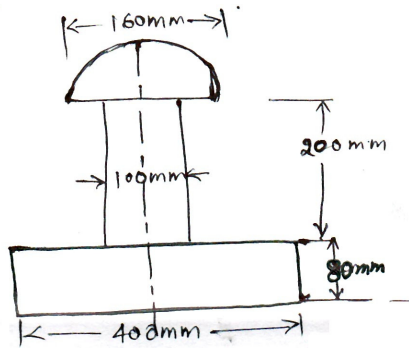
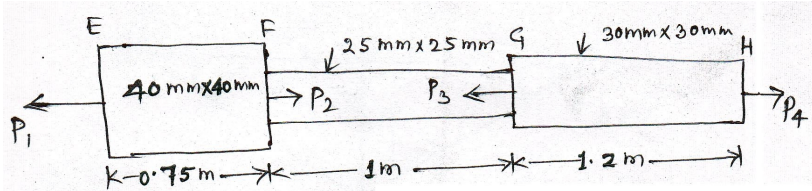


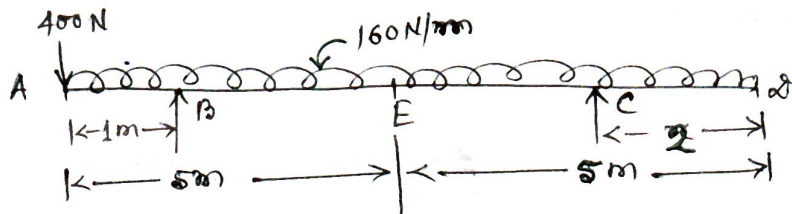
Q-6. A compound plane is made from a rectangle 400 mm by 80mm, a rectangle 100mm by, 200mm and a semicircle 160 mm diameter. Locate the C.G of the combination. (20)



Q-7. A member EFGH is subjected to point loads P_1 , P_2 , P_3 and P_4 as shown in figure. Calculate the force P_3 necessary for equilibrium, if $P_1 = 120\text{KN}$, $P_2 = 220\text{KN}$, $P_4 = 160\text{KN}$. Also determine the net change in length of member. Take $E=200\text{ GN/m}^2$. (20)



Q-8. A horizontal beam AD, 10m long carries udl of 160N/m and a point load of 400N at the left end 'A'. The beam is supported at a point 'B' which is 1m from A and at C which is on the right half of the beam and 2 metres from D. Draw SF and BM diagram. (20)



Roll No.

Lingaya's University, Faridabad
B.Tech. 1st Year (Term – III)
Examination – May, 2010
Engineering Mechanics (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.

Section – A

Q-I Part –A

Select the correct answer of the following Multiple choice questions (1x10)

(i) If the resultant of two P & Q acting at an angle θ makes an angle ' λ ' with P then

(a) $\tan \alpha = \frac{Q \sin \theta}{P - Q \sin \theta}$

(b) $\tan \alpha = \frac{Q \sin \theta}{P + Q \cos \theta}$

(c) $\tan \alpha = \frac{P \sin \theta}{P - Q \cos \theta}$

(d) $\tan \alpha = \frac{P \sin \theta}{P + Q \tan \theta}$

(ii) A steel rod 20 mm diameter and 1 m long is subjected to a pull of 31400 N. If modulus of elasticity is $2 \times 10^5 \text{ N/mm}^2$, the elongation of the rod will be

- (a) 0.05 mm (b) 0.50 mm (c) 5.0 mm (d) 50 mm

(iii) The shear stress is maximum on a shaft at

- (a) centre (b) surface (c) same throughout (d) none of these

(iv) Effect of moment on a body is

- (a) to turn it (b) to move it up
(c) to move it down (d) None of these

(v) In a couple the lines of action of the forces are

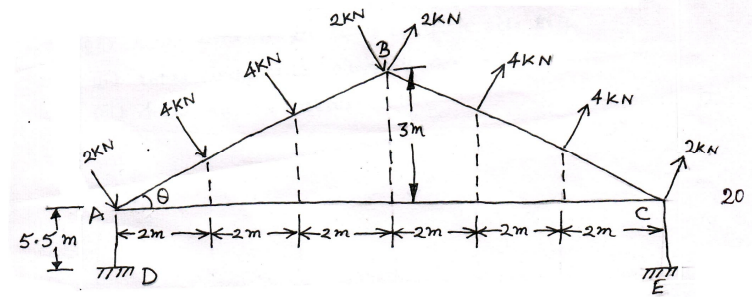
- (a) parallel (b) inclined (c) vertical (d) horizontal
- (vi) Bending moment at the end points of a simply supported beam is
 (a) maximum (b) minimum (c) zero (d) may be anything
- (vii) For analyzing a truss by method of joints, a joint is selected where number of unknown are not more than
 (a) 3 (b) 5 (c) 4 (d) 2
- (viii) The velocity of a body on reaching the ground fallen from a height 'h' is given by
 (a) $v=2gh$ (b) $v=2gh^2$ (c) $v = \sqrt{2gh}$ (d) $v = 1/2gh$
- (ix) The magnitude of force which acts on a body of mass 150 kg and produces acceleration $3m / sec^2$ in the direction of force is
 (a) 50 N (b) 150 N (c) 900 N (d) 450 N
- (x) A cantilever beam of span 'l' carries u.d.l. wN/m over entire span. The B.M at the fixed end is
 (a) $wl^2/2$ (b) wl (c) 0 (d) $-wl$

Part-B

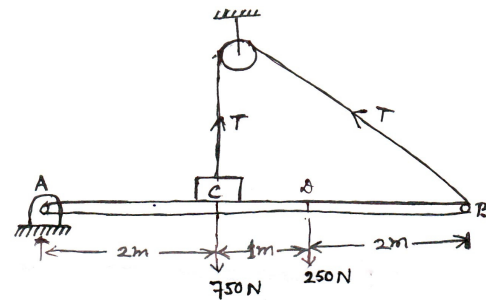
- (i) Establish relationship between the elastic constants Young's Modulus (E) & Modulus of Rigidity (C). (5)
- (ii) What are different types of loads acting on a beam? Show them by neat sketches. (5)

Section - B

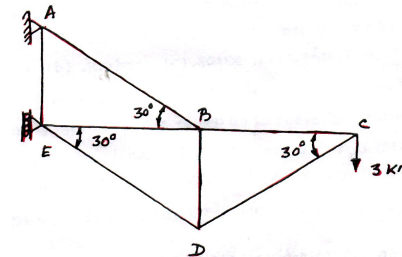
Q-2. In the figure given below, four parallel forces are acting on AB and four on BC. Find resultant of these eight coplanar forces. Also determine its position with respect to 'D'. (20)



Q-3. In the figure shown below, beam AB is horizontal. Weight of block 'C' is 750N. Determine (i) Reaction components at pin 'A' (ii) Tension in cable (iii) Force exerted by 'C' on beam AB. (20)



Q-4. Determine the force in each member of the loaded truss. (20)



Section -C

Q-5. Derive the torsion formula for a shaft transmitting torque. (20)

$$\frac{T}{J} = \frac{C\theta}{l} = \frac{\tau}{R}. \quad (20)$$