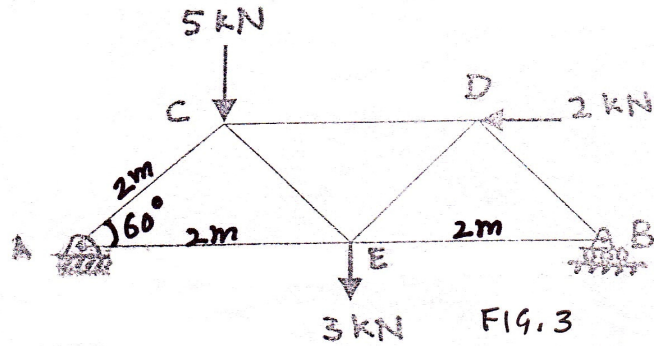
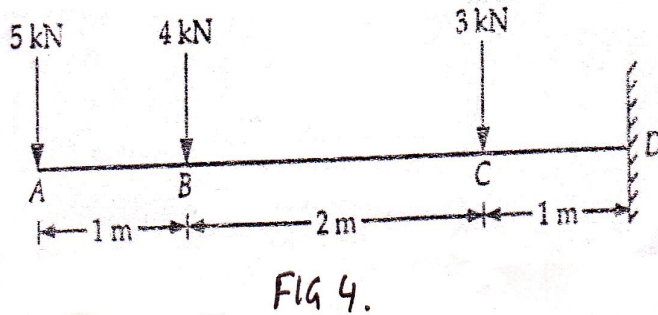


- Q-6. A truss is loaded and supported as shown in fig. 3. Find the axial forces on member DC, DE and BE. [20]



- Q-7. Draw the shear force and bending moment diagrams for the beam loaded and supported as shown in fig. 4. [20]



- Q-8. A motorist is driving at 80 Km/hr on the curved portion of a highway of 400 m radius. He suddenly applies the brakes and decreases speed to 45 Km/hr at a constant rate in 8 secs. Determine the tangential and normal components of acceleration (a) immediately after the application of brakes and (b) 4 seconds later. [20]

Roll No.

Lingaya's University
B.Tech. 1st Year (Term - II)
Examination - Feb 2011
Engineering Mechanics (ME - 101)

[Time: 3 Hours]

[Max. Marks: 100]

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

Note: - Attempt five questions in all. All questions carry equal marks. Question no. 1 is compulsory. Select two questions from Section B and two questions from Section C.

Section - A

Q-1. Part - A

Select the correct answer of the following multiple choice questions. [10x1=10]

- (i) If the sum of all the forces acting on a body is zero, then the body may be in equilibrium provided the forces are

(a) Concurrent	(b) Parallel
(c) Like parallel	(d) Unlike parallel
- (ii) Two parallel forces F_1 and F_2 act on a rigid body at points A and B lying on a straight line such that $AB = 5$ m. The resultant of these two forces act at a point C lying on AB such that $AC : AB = 2:3$ are they

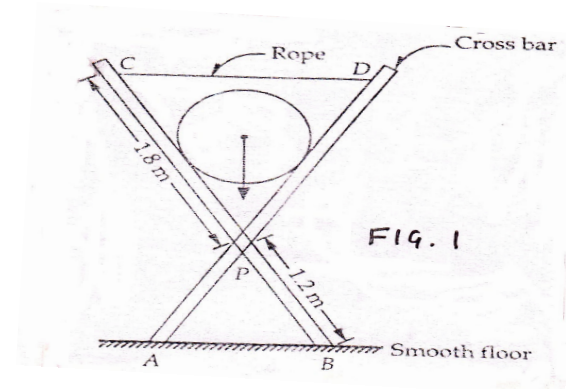
(a) Like parallel forces	(b) Unlike parallel forces
(c) Both a and b	(d) None of these
- (iii) A moment of a force about any point P is geometrically equal to area of the triangle whose base is the line representing the force and vertex is the point about which the moment is taken

(a) Half	(b) Same
(c) Twice	(d) None

- (iv) The C.G. of a hemisphere lies at a distance of units from its base measured along vertical radius
 (a) $3R/8$ (b) $3/8R$
 (c) $8R/3$ (d) $8/3R$
- (v) The moment of Inertia of a triangular section of base b and height h about an axis through its base is given by
 (a) $1/12 bh^3$ (b) $1/18 bh^3$
 (c) $1/36 bh^3$ (d) $1/24 bh^3$
- (vi) In method of section, the section must pass through not more than members
 (a) 3 (b) 2 (c) 4 (d) 1
- (vii) If a particle is moving along the circumference of a circle at a rate 1 m/sec, then the particle is moving with
 (a) Uniform velocity (b) Uniform speed
 (c) Average velocity (d) Average speed
- (viii) The bending moment on a section is maximum when shearing force is
 (a) Maximum (b) Minimum
 (c) Zero (d) Changes sign
- (ix) The relationship $S = ut + 1/2at^2$ can be used to the bodies moving with
 (a) Any type of motion (b) Uniform velocity
 (c) Uniform acceleration (d) both b and c
- (x) For a perfect truss having 13 members, the number of joints must be equal to
 (a) 6 (b) 8 (c) 10 (d) 13

Part – B

- (a) Explain what do you mean by moment of a force about a point in a planar force system and explain Varignon's theorem for the moments. [5]
- (b) Draw the free body diagram of (a) the cylinder (b) Rod BC in the figure 1. assuming the floor is smooth. [5]



Section – B

- Q-2. Derive an expression for load carried by each tube and the stresses and strain developed in each tube for a compound bar made up of three materials of equal length and having respective moduli of elasticity as E_1, E_2, E_3 and cross sectional areas as A_1, A_2, A_3 . The load in each component is axial tensile and there is no buckling. [20]
- Q-3. Derive the expression to estimate the outside diameter of a hollow shaft for given speed of rotation, power to be transmitted and the maximum allowed shear stress and ratio of outside dia (D) to inside dia (d).
 Assume $d = nD$ [20]
- Q-4. (a) State and prove perpendicular axis theorem for a plane lamina.
 (b) Discuss in detail the procedure followed to find center of gravity by composite body method. [2x10=20]

Section – C

- Q-5. A slab of hall 4 m x 5 m carries four loads normal to the slab as shown in the fig 2. Find out the resultant force and moment at point 'O'. [20]

