

Q-7. Construct the shear force and bending moment diagrams for the cantilever beam as shown in Fig 4 below. (20)

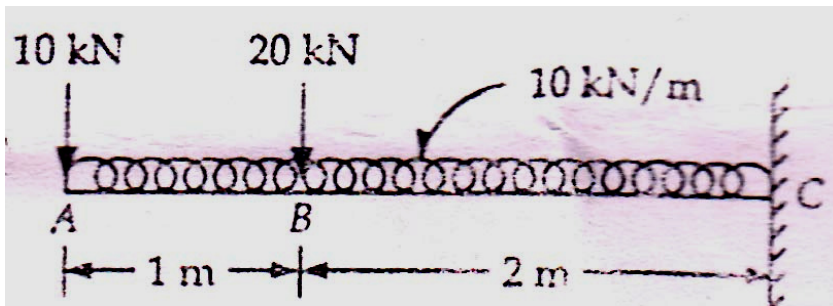


Fig.-4

Q-8. The rectilinear motion of a motor car starting from rest is prescribed by the relation $a = 6/(1.5V+2)$ where a = acceleration in m/s^2 and V is the velocity in m/s . Calculate the time taken and distance covered by the motor car to attain a velocity of $6 m/s$. (20)

Roll No.

Lingaya's University, Faridabad
 B.Tech. 1st Year (Term - I)
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 Engineering Mechanics (ME-101)

Time: 3 Hours]

[Max. Marks: 100

Before answering the question, 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. Question 1 is compulsory. Select two questions from Section B & two from Section C.

Section - A

Q-I Part A

Select the correct answer out of the choices given (10x1=10)

- (i) A system of coplanar forces acts on a plane Lamina in its plane. It will reduce to
 - (a) Only a single resultant
 - (b) Only a single couple
 - (c) Equilibrium condition
 - (d) None of these
- (ii) The greatest and least resultants of two forces F_1 and F_2 are 17 N and 3 N respectively. If the resultant is $\sqrt{149}$ N, the angle between them is
 - (a) 45°
 - (b) 30°
 - (c) 60°
 - (d) 90°
- (iii) A couple consists of
 - (a) Two equal like parallel forces
 - (b) Two unequal like parallel forces
 - (c) Two equal unlike parallel forces
 - (d) Two unequal unlike parallel forces.
- (iv) The C.G of a semicircle lies at a distance of----- units from its base measured along the vertical radius
 - (a) $3R/4\pi$
 - (b) $4R/3\pi$
 - (c) $4\pi/3R$
 - (d) $3\pi/4R$
- (v) Moment of Inertia of a semi circle about its base axis is given by
 - (a) $0.22 R^4$
 - (b) $0.11 R^4$
 - (c) $0.15 R^4$
 - (d) $0.20 R^4$
- (vi) For analyzing a structure by method of joints, a joint is selected where number of unknown are not more than
 - (a) 3
 - (b) 2
 - (c) 4
 - (d) 1

(vii) The linear displacement of a moving particle with respect to time 't' is given by $S = (t^3 - 6t^2 + 3t + 4)$ m. The velocity of the particle when acceleration is zero is

- (a) 3 m/s (b) -9 m/s (c) 48 m/s (d) -12 m/s

(viii) The point of contraflexure occurs only in

- (a) Cantilever (b) Simply supported beam
(c) Overhanging beam (d) Continuous beam

(ix) In a uniform motion, the acceleration of particle

- (a) varies with distance (b) remains constant (c) is zero (d) varies with time

(x) The relation between no. of joints (j) and no. of members (m) in a perfect truss is related by

- (a) $m = 2j + 3$ (b) $j = 3m + 3$ (c) $m = 2j - 3$ (d) $j = 3(m - 1)$

Part -2

(i) State the principle of Transmissibility of forces in a rigid body and explain it with the help of an example. (5)

(ii) Draw the free body diagram of the system as shown in Fig 1. below. (5)

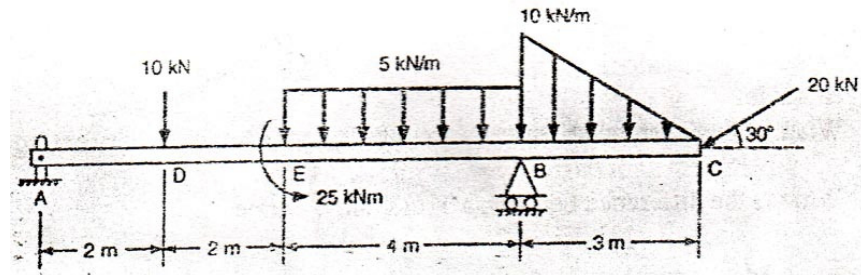


Fig. -1

Section - B

Q2. (i) Explain with the help of a neat diagram, the stress-strain curve for mild steel. (15)

(ii) Explain poisson's Ratio. (5)

Q3. Compare the allowable torque for two shafts of same length and weight. One of the shaft is 5cm in diameter while the other is hollow having Inner diameter half the outer diameter. Take the material of the two shafts to be same and assume that each of the two shafts are subjected to the same maximum shear stress. (20)

Q-4. Derive an expression for the Moment of Inertia of a triangular Lamina about its base and by using parallel axis theorem also find the M.I. about its centroidal axis parallel to the base. (20)

Section - C

Q-5. A force of 500 N acts along DE as shown in the Fig 2 below. Find the moment of this force about the point F. (20)

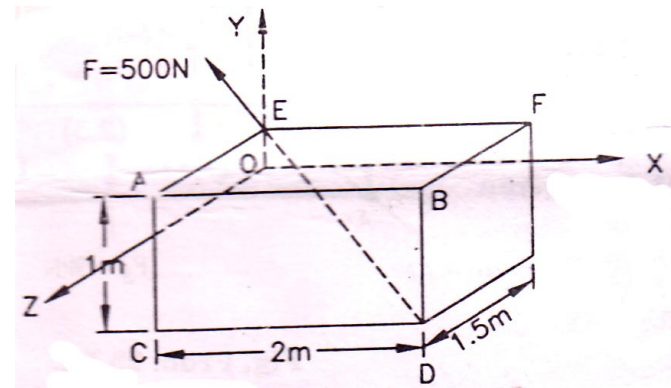


Fig.-2

Q-6. Determine the axial forces in the bar CD, DF and AC of the plane truss loading as shown in Fig 3 below. (20)

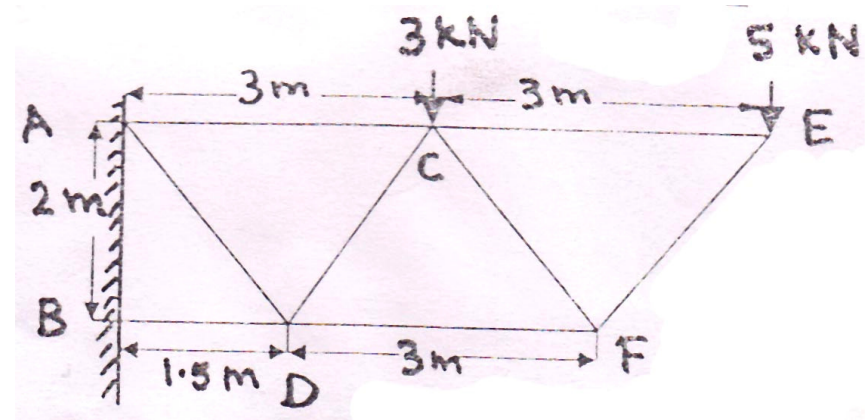


Fig.-3