



Year and Program: 2018-19 School of Technology Department of FY B.Tech

Course Code: FYT108

Course Title: Engineering Mechanics

Semester – I

Day and Date

Wednesday 05 Dec 18

End Semester Examination (ESE)

Time: Max Marks: 100

10:00 am to 1:00 pm

Instructions:

- 1) All questions are compulsory.
- 2) assume suitable data wherever necessary.
- 3) Figures to the right indicate full marks.

Q.1 Solve the following

Mark
s
Bloom's
Level
CO

- a) The angle between the two concurrent forces is 90° and their resultant is 2500 N. The resultant makes an angle of 45° with one of the force. Determine the magnitude of each force.

07 L₃ CO1

OR

- a) Two identical sphere P and Q each of weight 50N and radius of 100mm rest in a box of width 360mm as shown in fig. 1a. Determine the reaction at the point of contact A, B and C.

07 L₃ CO1

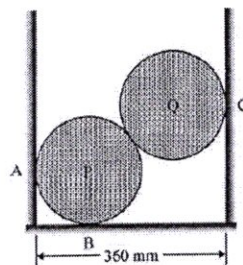


Fig.1a.

- b) For the force system shown in fig.1b, find the resultant and its point of application w.r.t. point A along the bar.

08 CO2

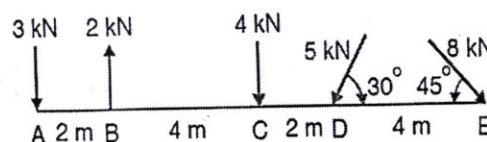


Fig.1b

OR

- b) Determine position of centroid of the shaded area as shown in fig. 1c. w.r.t. origin O

08

L₃

CO2

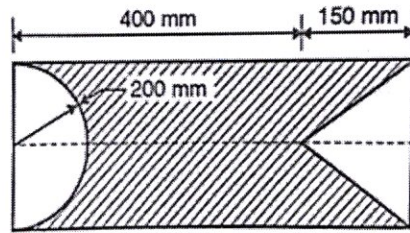


fig. 1c.

Q.2 Solve the following

- a) Determine forces in all member of the truss shown in fig. 2a by any method.

07

L₃

CO3

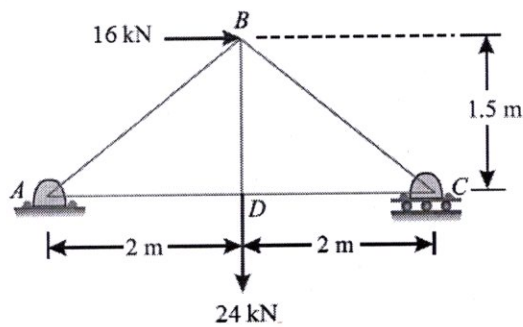


fig. 2a

OR

- a) Determine Reaction R_A and R_B at support A and B of horizontal beam AB as shown in fig.2b

07

L₃

CO3

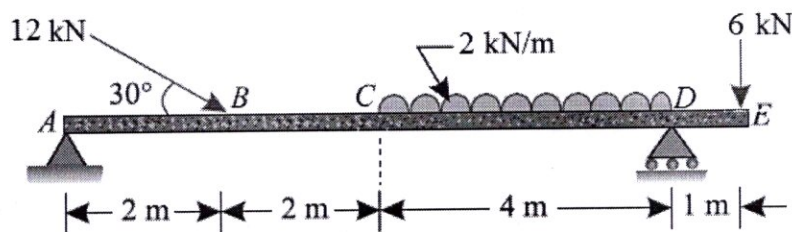


Fig.2b

- b) Block B moves downward with a constant velocity of 20mm/s. At $t = 0$, block A is moving upward with a constant acceleration, and its velocity is 30mm/s as shown in fig.2c. Knowing that at $t = 3$ sec, slider block C has moved 57 mm to the right, determine, a) velocity of slider block C at $t = 0$ b) The acceleration of A and C.

08

L₃

CO4

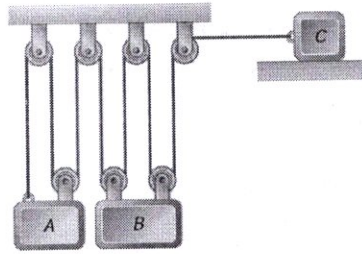


Fig.2c

OR

- b) A baseball player A hits the baseball at $V_A = 16 \text{ m/s}$ and $\theta_A = 60^\circ$ from the horizontal. When the ball is directly overhead of player B, he begins to run under it. Determine the constant speed at which B must run in order to make the catch at the same elevation. 08 L₃ CO4

Q.3 Solve any Two

- a) Explain the following: 08 L₂ CO1
 1) Law of parallelogram of forces
 2) Lami's Theorem
- b) Explain the following terms: 08 L₂ CO2
 1) Gravity axis of the body 2) Centers of gravity
 3) Center of mass 4) Centroid
- c) Explain the following: 08 L₂ CO3
 1) Parallel axis theorem 2) Polar Moment of Inertia
- d) Explain the following: 08 L₂ CO4
 1) Projectile motion 2) Relative motion

Q.4 Solve any Two

- a) The coefficients of friction between blocks A and C and the horizontal surfaces are $\mu_s = 0.24$ and $\mu_k = 0.20$ as shown in fig.3a. Knowing that $M_a = 5 \text{ kg}$, $M_b = 10 \text{ kg}$, and $M_c = 10 \text{ kg}$, determine (a) the tension in the cord, (b) the acceleration of each block. 09 L₃ CO5

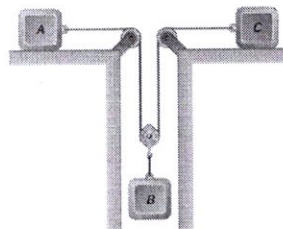


Fig.3a

Q.5	b)	If an automobile's breaking distance from 90 kmph is 50 m on level pavement, determine the automobile's breaking distance from 90 kmph when it is a) Going up 5° inclined b) Going down 3% incline.	09	L ₃	CO5
	c)	A body of mass 200kg is initially stationary on a 15° inclined plane. What distance along the incline must the body slide before it reaches a speed of 10m/s? Take coefficient of friction between the body and inclined plane is 0.1.	09	L ₃	CO5
	Solve any Two				
Q.6	a)	A ball of 4 kg mass moving with velocity of 2m/s impinges directly on another ball of 5 kg mass moving with a velocity of 1 m/s in opposite direction. If $e = 0.5$, find the velocity of balls after impact. Also find the loss of energy due to impact.	09	L ₃	CO6
	b)	A pile of 500 kg mass is driven into ground by dropping a hammer freely, having as mass of 318 kg through a height of 2.7 m. If the pile is driven into the ground by 0.15m, calculate the average resistance of the soil.	09	L ₃	CO6
	c)	A vehicle of mass 600 kg and moving with a velocity of 12 m/s strikes another vehicle of mass 400 kg moving at 9 m/s in the same direction. Both get coupled together due to impact. Find the common velocity with which the two vehicles will move. Also find the loss of K.E. due to impact.	09	L ₃	CO6
Q.6	Solve any Three				
	a)	Explain D'Alembert Principle	06	L ₂	CO5
	b)	Explain Kepler's laws of planetary motion	06	L ₂	CO5
	c)	Explain a) Principle of work and energy	06	L ₂	CO6
		b) Principle of Impulse and Momentum			
	d)	Explain Different types of impact and Coefficient of restitution.	06	L ₂	CO6

page