Sanjay Ghodawat University, Kolhapur
Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

2018-19
EXM/P/09/01

Year and Program:2018-19 | **School of Technology** | **Department of Civil Engineering**

Course Code: FYT 108 | **Course Title: Engineering Mechanics** | **Semester – II**

Day and Date: Saturday 08/06/2019 | **End Semester Examination (ESE)** | **Time:** 3 Hrs. 10.30 am to 1.30 pm | **Max Marks: 100**

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

			Marks	Bloom's Level	CO
Q.1	a)	Four forces act on a 700 × 375-mm plate as shown in Fig 1.1(a). (*a*) **Calculate** the resultant of these forces.	07	L3	CO 1

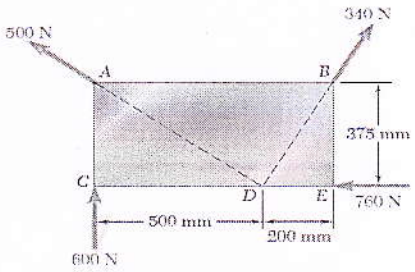

Fig 1.1 (a)

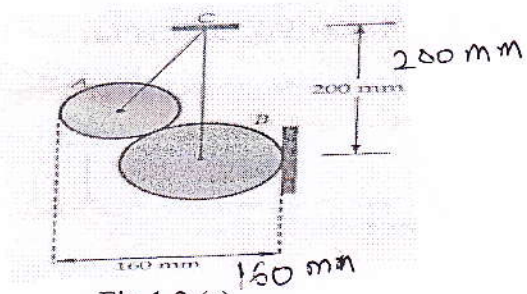

Fig 1.2 (a)

OR

	a)	Two cylinders A and B of dia. 8cm & 12cm resp. are held in equilibrium by separate string as shown in Fig 1.2 (a). If wt. of cylinder A & B are 20N and 40N resp. **Find** tension in strings and reactions at all points of contacts.	07	L3	CO 1
	b)	**Determine** the centroid of shaded area as shown in Fig 1.1 (b)	08	L4	CO 2

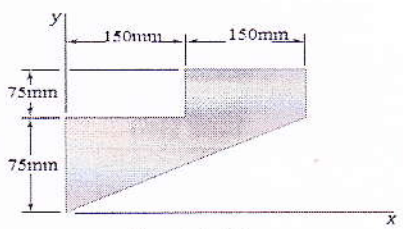

Fig 1.1 (b)

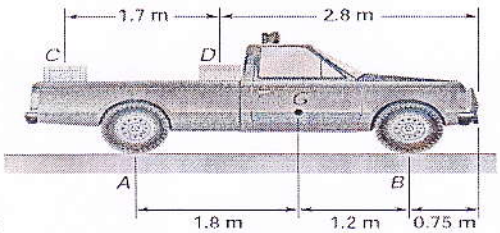

Fig 1.2(b)

OR

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b) Two crates, each of mass 3.4335 KN, are placed as shown in Fig 1.2(b) the bed of a 13.7340 KN pickup truck. **Determine** the reactions at each of the two (*a*) rear wheels *A*, (*b*) front wheels *B*. 08 L4 CO 2

Q.2 a) The truss shown Fig 2.1(a) is one of several supporting an advertising panel. **Find** the forces in BD, DE, AB and AC members of the truss by method of joint for a wind load equivalent to the two forces shown. State whether each member is in tension or compression. 07 L3 CO 3

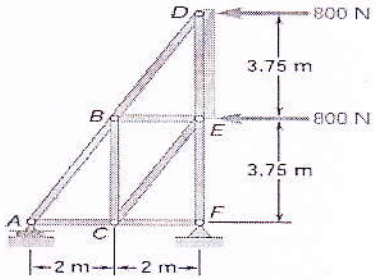

Fig 2.1(a)

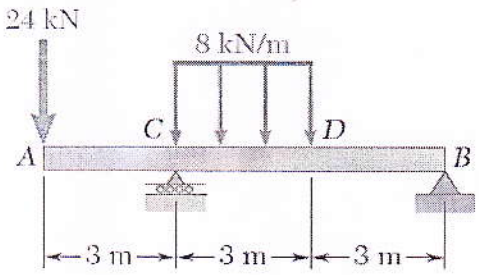

Fig 2.2(a)

OR

a) Find the support reactions of the beam shown in Fig 2.2(a). 07 L3 CO 3

b) As relay runner A enters the 20-m-long exchange zone with a speed of 12.9 m/s, he begins to slow down shown in Fig 2.1 (b). He hands the baton to runner B 1.82 s later as they leave the exchange zone with the same velocity. Determine (a) the uniform acceleration of each of the runners, (b) when runner B should begin to run. 08 L4 CO 4

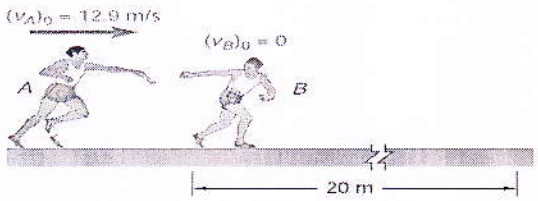

Fig 2.1(b)

OR

b) A cricket ball thrown from a height of 1.8m above ground level at an angle 30° with the horizontal with a velocity of 12m/sec is caught by a fielder at height of 0.6m above ground level. Determine the distance between the two players. 08 L4 CO 4

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Q.3 **Solve any Two**

a) **Explain** the following: 08 L_2 CO 1

i) Define a 'Force'. State the characteristics of a force.

ii) Explain Resolution and Composition of forces.

b) **Explain** the following terms: 08 L_2 CO 2

i) Explain Free Body Diagram with suitable example.

ii) Define; Moment and Couple.

c) **Explain** the following: 08 L_2 CO 3

i) Define; 1) Polar Moment of Inertia 2) Radius of Gyration

ii) Explain 1) Coefficient of Friction 2) Angle of friction

d) **Explain** the following: 08 L_2 CO 4

a. Dependent motion b. Projectile motion

Q.4 **Solve any Two**

a) Block A has weight 300N and Block B has weight 50N as shown in Fig 4.1 (a). Determine speed of block A after it moves 1.5m above the plane, starting from rest. Neglect friction and mass of the pulleys. 09 L4 CO 5

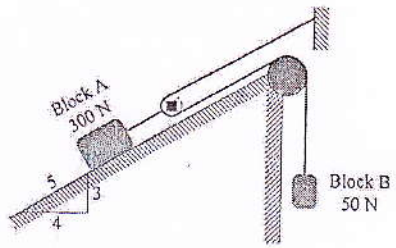

Fig 4.1 (a)

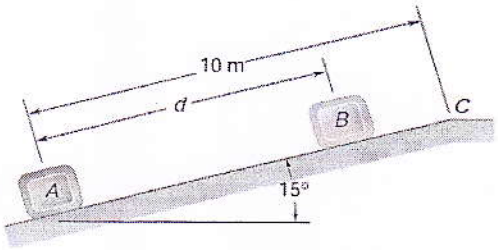

Fig 4.1 (b)

b) A package is projected up a 15° incline at *A* with an initial velocity of 8 m/s as shown in Fig 4.1 (b). Knowing that the coefficient of kinetic friction between the package and the incline is 0.12, determine (*a*) the maximum distance d that the package will move up the incline, (*b*) the velocity of the package as it returns to its original position. 09 L4 CO 5

c) Determine a force P on the upper block which can impart an acceleration of $3m/s^2$ to both blocks. Take coefficient of friction 0.4 for all contact surfaces. Use dynamic equilibrium principle. 09 L4 CO 5

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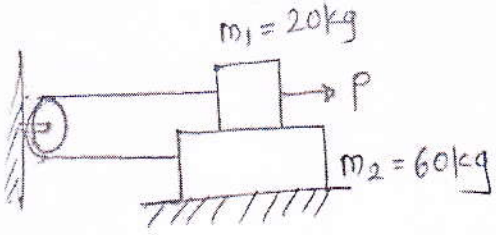

Q.5 **Solve any Two**

a)	A 80N body moving to the right at a speed of 3m/s strikes a 10N body that is moving to the left at a speed of 10m/s. The final velocity of 10N body is 4 m/s to the right. **Calculate** coefficient of restitution and the final velocity of the 80N body.	09	L3	CO 6
b)	A 20 Kg wagon moving at a speed of 0.5 m/s towards right collides with 35kg which is at rest. If after collision the 35 kg wagon is observed to move to the right at a speed of 0.3m/s. Find coefficient of restitution between the two wagons.	09	L3	CO 6
c)	A golf ball is dropped from a height of 10m on a fixed steel plate. The coefficient of restitution is 0.894. Find the height to which the ball rebounds on the First, Second and third bounces.	09	L3	CO 6

Q.6 **Solve any Three**

a)	Explain in detail three Kepler's law of planetary motion with neat diagram.	06	L2	CO 5
b)	Explain in detail following terms 1. Linear momentum of a particle 2. Dynamic Equilibrium 3. Equations of motion in terms of radial and transverse component	06	L2	CO 5
c)	Explain the following 1. Conservative Forces & Conversion of Energy. 2. Potential Energy.	06	L_2	CO 6
d)	Explain in details: a) Impact and Types of Impact b) Coefficient of restitution	06	L_2	CO 6

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