

17BME021

SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA

Department of Mechanical Engineering

MinorII Exam., B.Tech Ist Sem(Engg.Mechanics)

Attempt all Questions

Code:

All Questions carry equal marks

Max. Marks = 20

1. Briefly explain the following: a) Laws of Friction b) Principal axis and Principal Moment of Inertia.
2. For the given system of wedges (Fig.1), determine least value of the horizontal force P required to raise Block A. The coefficient of static friction for all contact surfaces is 0.3. Assume Block B to be of negligible weight.
3. Determine the principal moments of inertia of the standard rolled-steel angle section with respect to the given centroidal x and y axes(Fig.2). $I_x=17.40 \text{ mm}^4$ and $I_y=6.27 \text{ mm}^4$ (Fig.2)
4. A car is being driven at 100 km/hr along a straight highway when the driver hears about an accident 50m ahead. In order to stop the car .
 - a. What would be the acceleration of the car?
 - b. How long did driver took to stop the car?

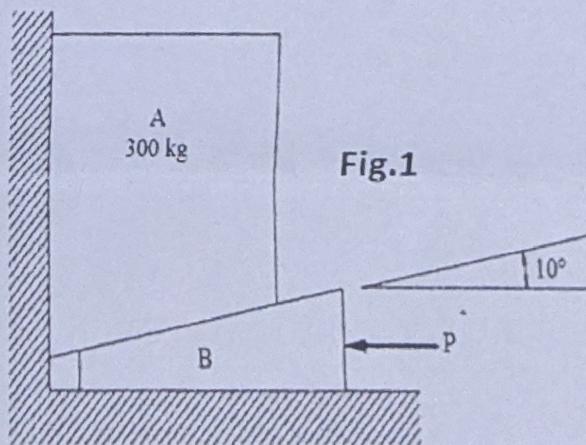


Fig.1

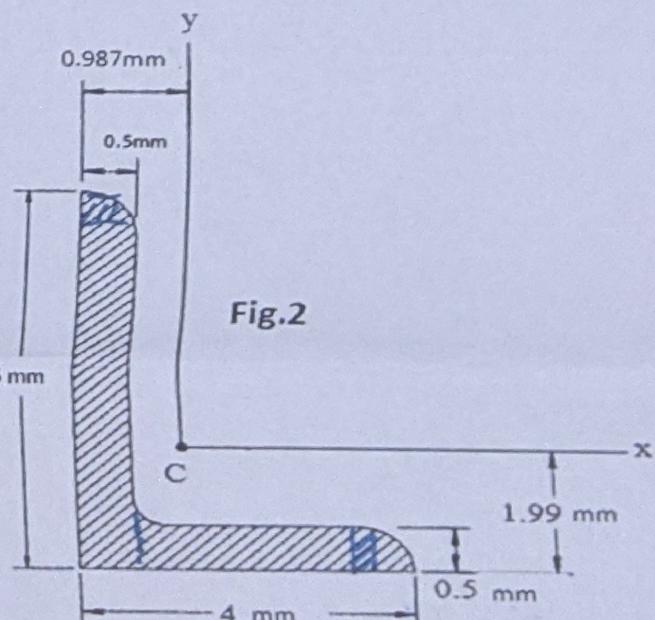


Fig.2

SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA
Major (3rd Semester) – 2017-18

Entry No:

1 7 B M E O 2 1

Total number of pages: [02]

Total number of questions: 05

B.Tech. || SME || Sem I
Engineering Mechanics
Subject Code: MEL 1012

Time allowed: 2.30

Max Marks: 50

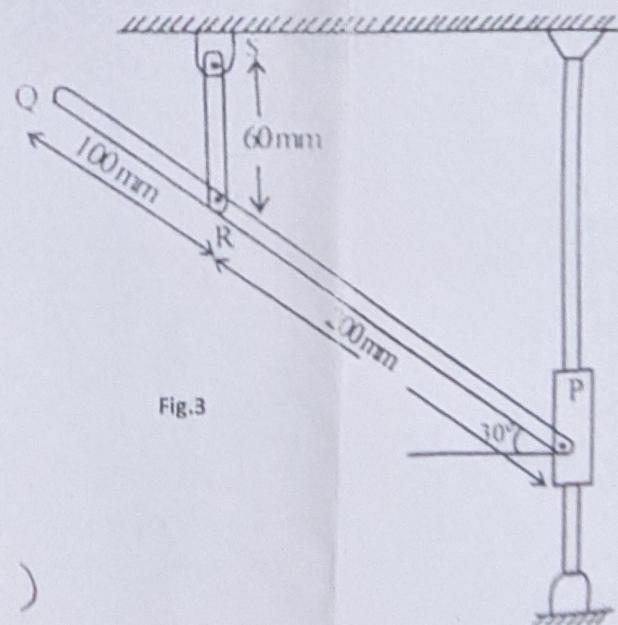
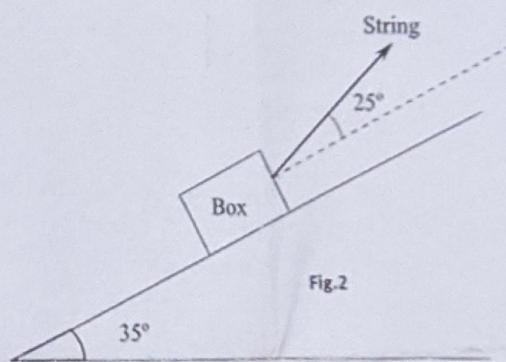
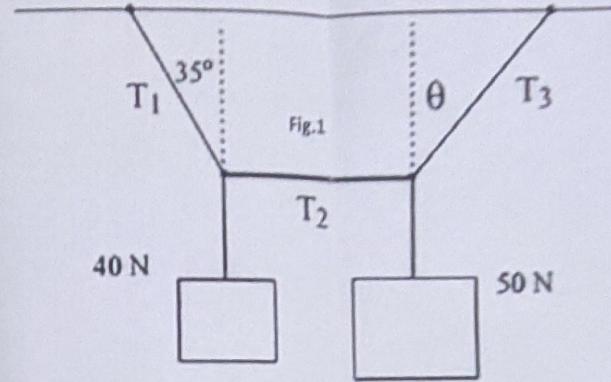
Important Instructions:

- All questions are compulsory
- Assume any missing data

- Q. 1. a) Explain the following: a) Projectiles b) Motions in a rigid body [2.5x2]
b) The system in Fig.1 is in equilibrium with the string in the center exactly horizontal. Find (a) tension T_1 , (b) tension T_2 , (c) tension T_3 and (d) angle θ . [5]
- Q. 2 a) What are the assumptions considered while analyzing Trusses? (2) [2.5]
b) A box of mass $M = 10 \text{ Kg}$ rests on a 35° inclined plane with the horizontal. A string is used to keep the box in equilibrium. The string makes an angle of 25° with the inclined plane. The coefficient of friction between the box and the inclined plane is 0.3. (5)
i. Draw a Free Body Diagram including all forces acting on the particle with their labels.
ii. Find the magnitude of the tension T in the string.
iii. Find the magnitude of the force of friction acting on the particle. [2.5x3]
- Q. 3 A missile is being fired at an angle of 60° with the horizontal in order to strike a target located at a horizontal and vertical (above the ground) distance of 100m and 30m respectively. Determine the following:
a. Velocity of projection
b. Maximum height attained
c. Total time of flight
d. Striking velocity [2.5x4]
- Q. 4 a) Briefly discuss Motion curves. [4]
b) The 50Kg crate as shown in Fig.2 rests on a horizontal plane for which the coefficient of kinetic friction is μ_k is 0.3. If the crate is subjected to a 400-N towing force, determine the velocity of the crate in 3 sec starting from rest. [6] $\angle 30^\circ$ w.r.t. Horizontal
- Q. 5 a) What is an Instantaneous Centre and, in how many ways we can draw Instantaneous Centre. [4]
b) A mechanism as shown in Fig.3 is moving with a velocity of 2m/s upwards. Determine: i) angular velocity of rod PQ ii) velocity of point R and iii) velocity of point Q. [7]

P.T.O for Figures

FIGURES



IS

Mechanics

Mechanics

7107

SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA

School of Mechanical Engineering

B. Tech. (Branch) Minor Examination (Even) 2018-19

Entry No: 1 8 B M E 0 2 9

Date:

Total Number of Pages: [02]

Total Number of Questions: [04]

Course Title: Engineering Mechanics

Course Code: MEL1012

Time Allowed: 1.5 Hours

Max Marks: [20]

Instructions / NOTE

Attempt All Questions.

- i. Support your answer with neat freehand sketches/diagrams, wherever appropriate.
- ii. Assume an appropriate data / information, wherever necessary / missing.
- iii. Use of IS Code (Mention Number) is permissible in examination.

Section - A

Q1.	Explain the following: (a) Mechanics (b) Law of Parallelogram (c) Varignons theorem	[02]	CO1
		[1.5]	CO1
		[1.5]	CO1
Q2.	(a) What is moment? (b) Two boys are playing by pulling on ropes connected to a hook in a rafter. The bigger one pulls on the rope with a force of 270 N at an angle of 55° from horizontal. The smaller boy pulls with a force of 180 N at an angle of 110° from horizontal.(Fig.1) i) which boy is exerting the greatest vertical force (downward) on the hook? ii)What is the net force (magnitude and direction) on the hook.	[01]	CO1
		[04]	CO2

Section - B

Q3.	Two equal smooth spheres each of weight W and radius r are placed in a vertical hollow cylinder of radius $'a'$ ($a > 2r$) open at both the ends and resting on a horizontal plane. Show that the least weight of the cylinder, so that it is not toppled is given by $2(a - r)W$.	[05]	CO2
		[05]	CO2
Q4.	(a) List the assumptions to be considered while dealing with trusses. (b) Determine force in every member of the truss as shown in Fig2.	[02]	CO2
		[03]	

Fig.1

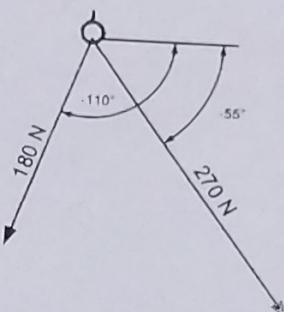
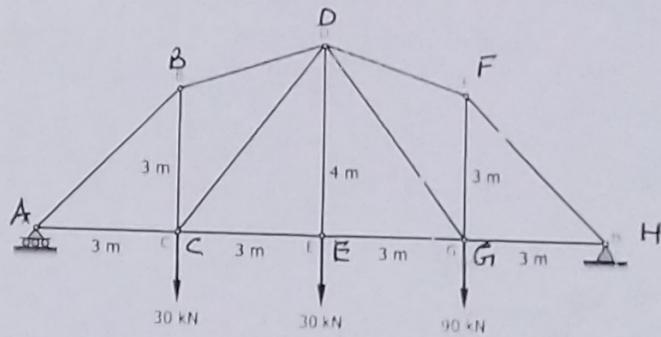


Fig.2



Course Outcomes

- CO1. To acquire basic knowledge related to Forces and Equilibrium conditions
- CO2. To analyse various systems existing in static equilibrium, e.g., blocks, wedges, ladders, trusses, etc
- CO3. To understand and apply the concepts of Centroid and Moment of Inertia on areas and rigid bodies
- CO4. To predict the effect of force on various Engineering systems in Dynamics

SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA

School of Mechanical Engineering

B. Tech. (Branch) Minor-2 Examination (Even) 2019

Entry No:

1 8 B M E 0 2 9

Total Number of Pages: [02]

Date:

Total Number of Questions: [04]

Course Title: Engineering Mechanics

Course Code: MEL1012

Time Allowed: 1.5 Hours

Max Marks: [20]

Instructions / NOTE

Attempt All Questions.

- i. Support your answer with neat freehand sketches/diagrams, wherever appropriate.
- ii. Assume an appropriate data / information, wherever necessary / missing.
- iii. Use of IS Code (Mention Number) is permissible in examination.

Section – A

Q1. Explain the following:

- (a) Friction [2] CO1
- (b) Principal Moment of Inertia [2] CO3
- (c) Uniform Motion [1] CO4

Q2.

- (a) What is angle of friction? [02] CO2
- (b) If the coefficient of static friction equals 0.3 for all surfaces of contact, determine the smallest value of force P necessary to raise the block A. Neglect the weight of the wedge B (Fig.1). [03] CO2

Section – B

Q3.

- (a) State Parallel axis theorem. [01] CO3
- (b) Compute the moment of inertia of the composite area about the x axis (Fig.2). [04] CO3

Q4.

- (a) Discuss Motion curves. [02] CO4
- (b) During a test rocket travels upwards at 75 m/s and when it is 40m from the ground its engine fails. Determine the maximum height reached by the rocket and its speed just before it hits the ground. While in motion the rocket is subjected to a constant downward acceleration of 9.81 m/s^2 due to gravity. Neglect the effect of air resistance. [03] CO4

Fig.1

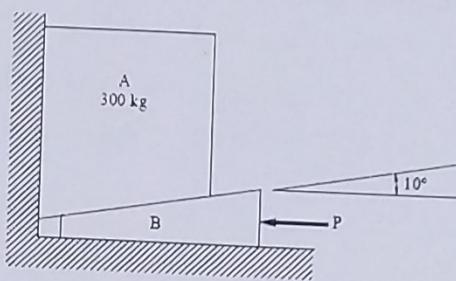
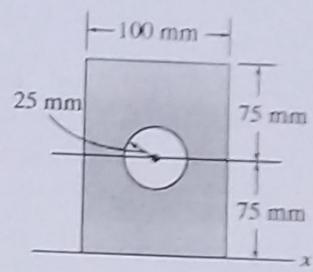


Fig.2



Course Outcomes

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SHRI MATA VAISHNO DEVI UNIVERSITY, KATRA

School of Mechanical Engineering

B. Tech. (Mechanical) Major Examination (Even/Summer) 2018-19

Entry No:

Total Number of Pages: [02]

Date:

Total Number of Questions: [05]

Course Title: Engineering Mechanics

Course Code: MEL 1012

Time Allowed: 3.0 Hours

Max Marks: [50]

Instructions / NOTE

- i. Attempt All Questions.
- ii. Support your answer with neat freehand sketches/diagrams, wherever appropriate.
- iii. Assume an appropriate data / information, wherever necessary / missing.
- iv. Use of IS Code (Mention Number) is permissible in examination.

Section - A			
Q1.	<p>Explain the following:</p> <p>a) Explain the following</p> <ol style="list-style-type: none"> i. Varignons theorem ii. Radius of gyration <p>b) The 20Kg homogeneous sphere rests on two inclines as shown in Fig.1. Determine contact reactions at A and B.</p>	[2.5] [2.5] [5]	CO1 CO3 CO1
Q2.	<p>a) Using the method of joints, determine all the zero-force members of the given roof truss. Assume all joints are pin connected.(Fig.2)</p> <p>b) A 75N force inclined at $\alpha=45^\circ$ is shown in Fig.3. The coefficient of static friction between the block and the floor is 1.3, and coefficient of kinetic friction is 1.1. What is the friction force between the block and the plane? Will the block move?</p>	[5] [5]	CO2 CO2
Q3.	<p>a) Briefly discuss theorem of i) parallel axis ii) perpendicular axis.</p> <p>b) Determine the principle moments of the beam's cross-sectional area with respect to axis passing through the centroid.(Fig.4)</p>	[4] [6]	CO3 CO3

Section - B

Q4.	<p>a) A 248 kg object moving at 19 m/s comes to stop over a distance of 38 m. What is the coefficient of kinetic friction between the surfaces?</p> <p>b) A baseball is thrown at an angle of 25° relative to the ground at a speed of 23.0 m/s. If the ball was caught 42.0 m from the thrower, how long was it in the air? How high was the tallest spot in the ball's path?</p>	[5] [5]	CO2 CO4
Q5.	<p>a) Derive formulae for safe speed in case of two wheeler moving on a levelled circular road.</p> <p>b) In the position shown, crank AB has a constant angular velocity $\omega_1 = 20$ rad/s counterclockwise. Determine the angular velocities and angular accelerations of the connecting rod BD and crank DE.(Fig.5)</p>	[5] [5]	CO4 CO4

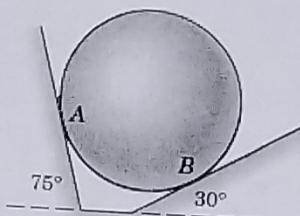


Fig.1

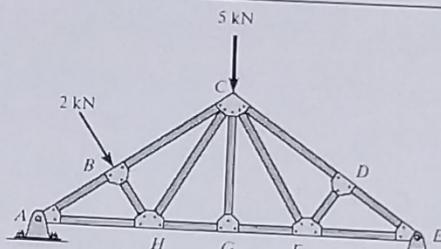


Fig.2

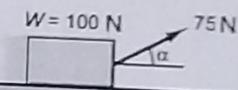


Fig.3

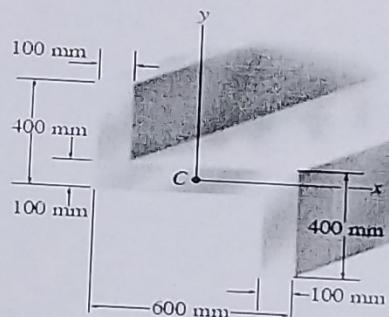


Fig.4

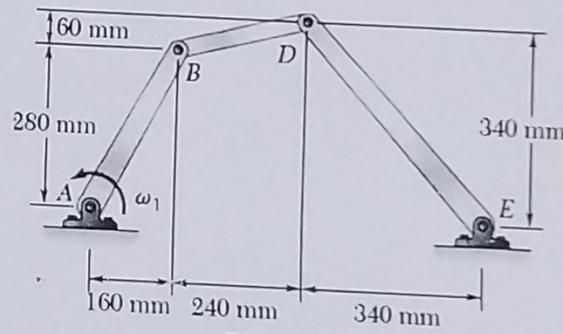


Fig.5

Course Outcomes

- CO1. To acquire basic knowledge related to Forces and Equilibrium conditions
- CO2. To analyse various systems existing in static equilibrium, e.g., blocks, wedges, ladders, trusses, etc
- CO3. To understand and apply the concepts of Centroid and Moment of Inertia on areas and rigid bodies
- CO4. To predict the effect of force on various Engineering systems in Dynamics

CO	Questions Mapping	Total Marks	Total Number of Students (to be appeared in Exam)
CO1	Q1a(i),b	7.5	
CO2	Q2a,b, Q4a	15	
CO3	Q1a(ii), Q3a,b	12.5	
CO4	Q4b, Q5a,b	15	