

# University of Mumbai

Curriculum Scheme: Rev2019

## All Programs

Examination: FE Semester I FH2022

Course Code: FEC104

Course Name: Engineering Mechanics

Time: 2.5 hours

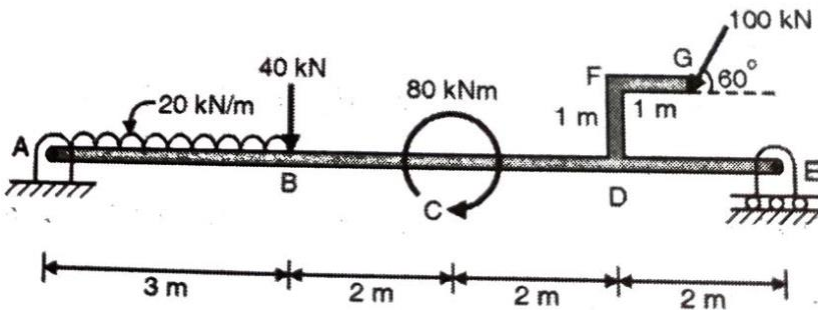
Max. Marks: 80

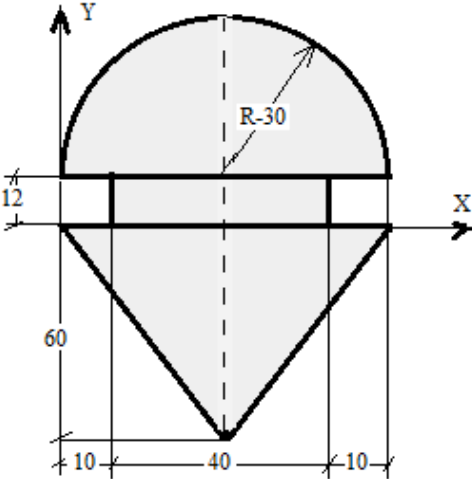
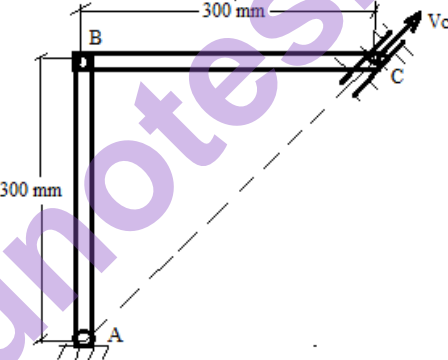
**Instructions :** 1. All the questions are compulsory.

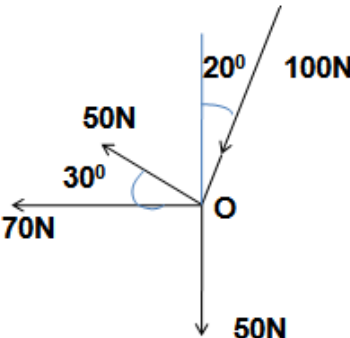
2. Each questions carry equal marks.

<b>Q1.</b>	<b>Choose the correct option for following questions. All the Questions are compulsory and carry 2 marks each</b>
1.	Pushing or pulling of a vehicle with same magnitude of force along the same line of action is called as _____.
Option A:	Equilibrium
Option B:	Principle of transmissibility
Option C:	Newtons III law
Option D:	Newtons II law
2.	Ratio of limiting friction and normal reaction is _____.
Option A:	Coefficient of friction
Option B:	Angle of friction
Option C:	Sliding friction
Option D:	Coefficient of restitution
Q3.	Any lamina when hangs freely at any corner of the lamina, then the vertical line .....
Option A:	Will pass through bottom left corner
Option B:	Will pass through bottom right corner
Option C:	Will pass through the centroid of a lamina.
Option D:	Will never pass through the centroid of a lamina.
Q4.	Conditions of equilibrium for coplanar concurrent force system are....
Option A:	2
Option B:	3
Option C:	0
Option D:	All above
Q5.	Where we apply Varignon's Theorem...
Option A:	To find magnitude of Resultant force.
Option B:	To find magnitude of Equilibrant force
Option C:	To find direction of resultant and equilibrant force.
Option D:	None of above three

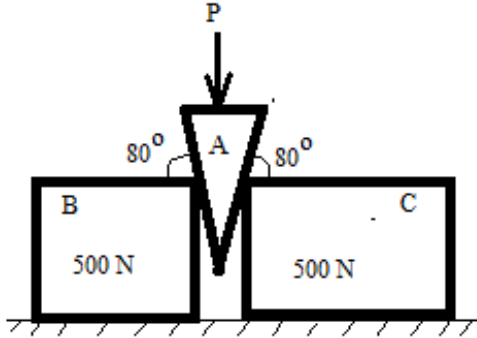
Q6.	Equilibrant force is always....
Option A:	Equal in magnitude, opposite in direction and collinear with Resultant force.
Option B:	Equal in magnitude, direction and collinear with Resultant force.
Option C:	Equal in magnitude, opposite in direction and parallel with Resultant force.
Option D:	None of above three.
Q7.	Two parallel equal forces acting in the opposite direction
Option A:	balance each other
Option B:	constitute a moment
Option C:	constitute a force couple system
Option D:	constitute a moment of the couple
Q8.	If stone is projected vertically up, its time of flight is _____.
Option A:	Inversely proportion to its mass
Option B:	Proportional to its initial velocity
Option C:	Proportional to its mass
Option D:	Inversely proportional to its initial velocity
Q9.	Velocity-time curve for the body projected vertically upwards is a _____.
Option A:	Straight line inclined to the time axis
Option B:	parabola
Option C:	ellipse
Option D:	curve
Q10.	Two force member is a ....
Option A:	Member which is connected at the ends, consider weightless and no external force acts along the member.
Option B:	Member which is connected anywhere; consider its own weight and no external force acts along the member.
Option C:	Member which is connected at the ends, consider its own weight and external forces acts along the member.
Option D:	All above are correct.

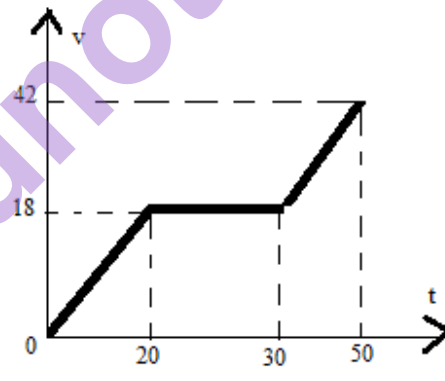
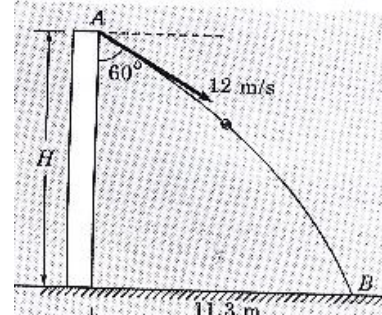
<b>Q2</b>	<b>Solve any Two. [10 marks each]</b>
A	Find the reactions at the supports A & B for the given beam shown in fig. 

B	<p>Find the centroid of the shaded area shown in fig. with respect to given reference axes X &amp; Y.</p> 
C	<p>Collar C moves with constant velocity of <math>V_C = 1.2 \text{ m/s}</math> up the incline, as shown in fig. Determine angular velocity of the link AB and BC and velocity of point B at the instant shown.</p> 

<b>Q3.</b>	<p><b>Solve any Two.</b> <span style="float: right;"><b>[10 marks each]</b></span></p>
A	<p>A concurrent system of forces is shown in the Error! Reference source not found.' Find the resultant passing through the origin</p> 



<b>B</b>	<p>A wedge 'A' of negligible weight is to be driven between two 500 N blocks B and C. Knowing that the coefficient of friction is 0.35 between the blocks and the horizontal surface and zero between the wedge and each of the block ,Determine the force P required to start moving wedge if the blocks are equally free to move.</p> 
<b>C</b>	<p>A stone is thrown vertically upward with a velocity 20 m/s while coming down it strikes a glass pan held half the height through which it has rises and losses half of its velocity in breaking the glass. Find the velocity of stone with which it strikes the ground.</p>

<b>Q4.</b>	<p><b>Solve any Two. [10 marks each]</b></p>
<b>A</b>	<p>The race car starts from rest and travels along a straight road until it reaches a speed of 42 m/s in 50 sec. as shown by v-t graph. Determine the distance travelled by race car in 50 sec. draw x-t and a-t graph.</p> 
<b>B</b>	<p>A ball thrown with a speed of 12m/s at an angle of <math>60^\circ</math> with a building strike the ground 11.3m horizontally from the foot of the building as shown in fig. Determine the height of the building and the velocity of ball with which it strikes the ground.</p> 

C

The jib crane shown in fig is subjected to three coplanar forces. Replace this loading by an equivalent resultant force and specify where the resultant's line of action intersects the column AB and boom BC.

