

**University of Mumbai**  
**Examination 2020**

Program: \_\_\_BE\_\_\_\_\_ Engineering

Curriculum Scheme: Rev 2019

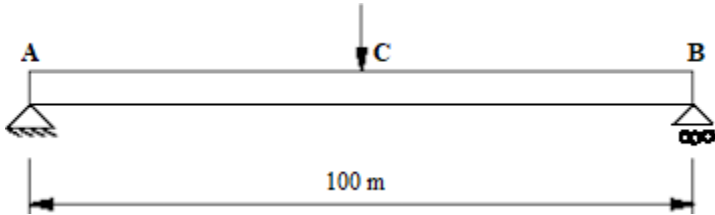
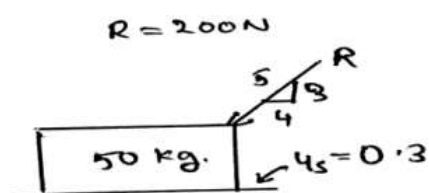
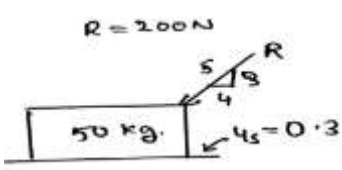
Examination: First Year Semester I

Course Code: FEC104\_\_\_\_\_ and Course Name: Engineering Mechanics

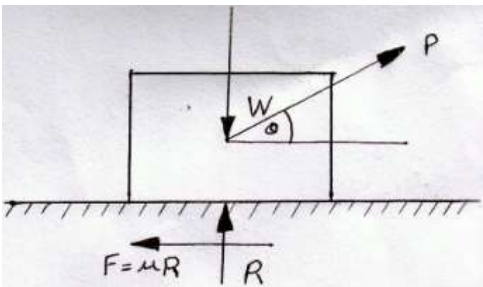
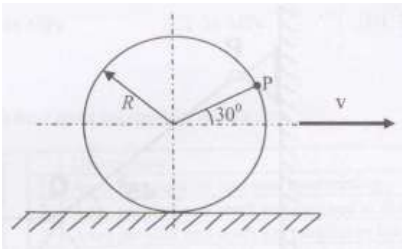
Time: 1 hour

Max. Marks: 50

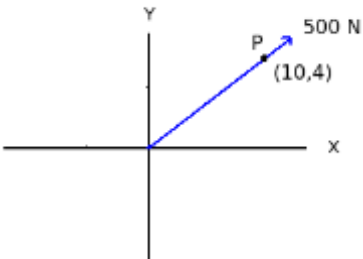
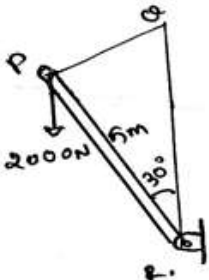
For the students:- All the Questions are compulsory and carry equal marks .

Q1.	<p>Find support reaction at point B of transversely loaded beams shown below, <math>AC=BC</math> and the load acting at point C is 200 kN</p> 
Option A:	100 N
Option B:	100000 N
Option C:	50 kN
Option D:	200 kN
Q2.	<p>Calculate the product of normal force and the coefficient of friction between the body and the surface.</p> 
Option A:	183 N
Option B:	116 N
Option C:	100 N
Option D:	180 N
Q3.	<p>Calculate the frictional force developed between the body and the surface.</p> 
Option A:	180 N
Option B:	16 N
Option C:	10 N

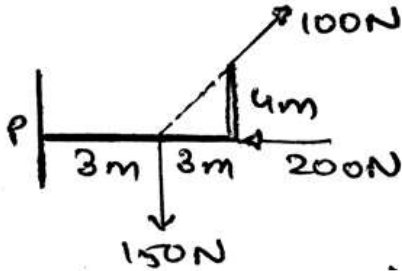
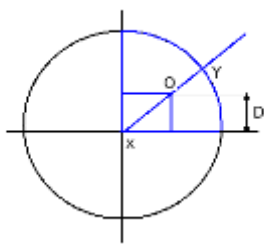
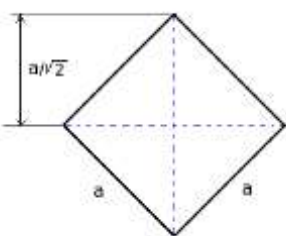
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Option D:	160 N
Q4.	<p>The value of Normal reaction (R) for the following figure is [Where, W = Weight of block, P = Applied force, <math>\mu</math> = Coefficient of friction, <math>\theta</math> = Angle]:</p> 
Option A:	$W - P\sin\theta$
Option B:	$W + P\sin\theta$
Option C:	$P - W\sin\theta$
Option D:	$P + W\sin\theta$
Q5.	On a ladder resting on smooth ground and leaning against vertical wall, the force of friction will be
Option A:	Towards the wall at its upper end
Option B:	Away from the wall at its upper end
Option C:	Upwards at its upper end
Option D:	Downwards at its upper end
Q6.	<p>A circular disk of radius R rolls without slipping at a velocity v. The magnitude of the velocity at point P is _____</p> 
Option A:	$3\sqrt{3}v$
Option B:	$3\sqrt{v/23}v/2$
Option C:	$v/2v/2$
Option D:	$2v/3\sqrt{2}v/3$
Q7.	To what height a ball falling freely from initial height of 1 meter will rise to, in second bounce. The coefficient of restitution for the pair having this impact is 0.5.
Option A:	0.0625 m
Option B:	0.5 m
Option C:	0.25 m
Option D:	0.75 m
Q8.	Find the Range and Time of flight when a projectile was fired at 50 m/s initial velocity at $30^\circ$ angle of Elevation.

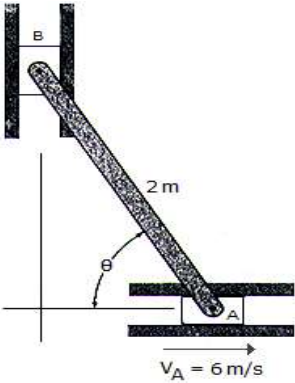
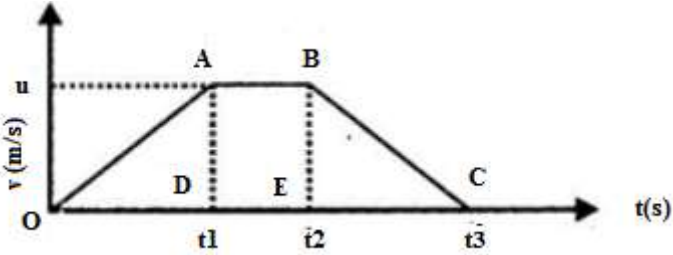
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Option A:	$R = 220.7 \text{ m} \ \& \ T = 5.1 \text{ sec}$
Option B:	$R = 5.1 \text{ m} \ \& \ T = 220.7 \text{ sec}$
Option C:	$R = 8.83 \text{ m} \ \& \ T = 127.4 \text{ sec}$
Option D:	$R = 127.4 \text{ m} \ \& \ T = 8.83 \text{ sec}$
Q9.	A man stands on a weighing machine in the lift. When the lift is stationary his weight is recorded as 40 kg. If the lift accelerates upwards with an acceleration of $2 \text{ m/s}^2$ what weight will the machine show?
Option A:	40 kg
Option B:	48 kg
Option C:	42 kg
Option D:	32 kg
Q10.	If the resolved force or the force which you get as the answer after solving the question is negative, then what does this implies?
Option A:	The work done is in the reverse direction w.r.t the direction set in the free body diagram
Option B:	The force is not in the reverse direction w.r.t the direction set in the free body diagram
Option C:	The force component is not possible
Option D:	The force is possible, but in the direction perpendicular to the resultant force
Q11.	What are the X and Y components of point P for the force system shown below? 
Option A:	$X = 186.00 \text{ N}, Y = 464 \text{ N}$
Option B:	$X = 464.23 \text{ N}, Y = 185 \text{ N}$
Option C:	$X = 466.12 \text{ N}, Y = -180 \text{ N}$
Option D:	$X=366 \text{ N}, Y = 80 \text{ N}$
Q12.	5) Find the moment of the force about the point R. 
Option A:	5000Nm

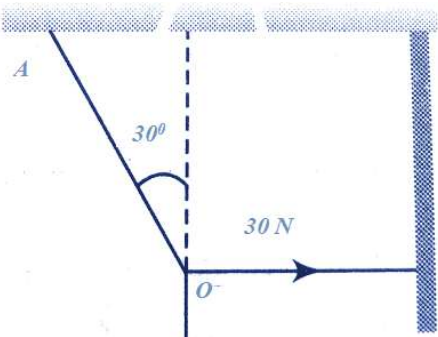
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	Option B: 5550Nm
	Option C: 6000Nm
	Option D: 7000Nm
Q13.	<p>Find the total resultant force acting vertically in the given figure below consisting of a beam of 'L' shape</p> 
	Option A: 180N
	Option B: 18N
	Option C: 10N
	Option D: 100N
Q14.	<p>What is the centroidal distance along the line of symmetry XO for the quarter circle shown below?(where <math>D = 4r/3\pi</math>)</p> 
	Option A: $\sqrt{(1/D)}$
	Option B: $\sqrt{D}$
	Option C: $\sqrt{2}(D)$
	Option D: $\sqrt{2} (D^2)$
Q15.	<p>What is the distance of the centroid with respect to the diagonal shown in the diagram below?</p> 
	Option A: $a/\sqrt{3}$
	Option B: $a/\sqrt{2}$
	Option C: $a/\sqrt{18}$
	Option D: $3a/\sqrt{2}$

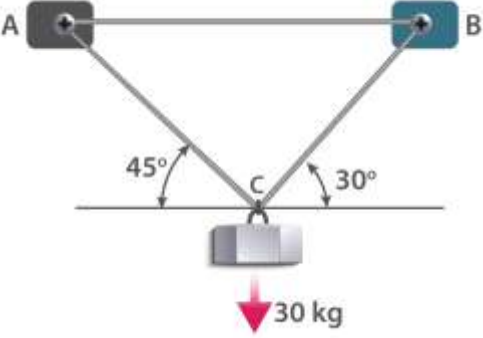
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Q16.	<p>The 2-m-long bar is confined to move in the horizontal and vertical slots A and B. If the velocity of the slider block at A is 6 m/s, determine the bar's angular velocity and the velocity of block B at the instant <math>\theta = 60^\circ</math>.</p> 
Option A:	$\omega_{AB} = 3.46 \text{ rad/s}$ ↻, $v_B = 3.46 \text{ m/s}$
Option B:	$\omega_{AB} = 3.00 \text{ rad/s}$ ↻, $v_B = 3.00 \text{ m/s}$
Option C:	$\omega_{AB} = 3.00 \text{ rad/s}$ ↻, $v_B = 6.00 \text{ m/s}$
Option D:	$\omega_{AB} = 6.00 \text{ rad/s}$ ↻, $v_B = 10.39 \text{ m/s}$
Q17.	What is the acceleration if the body starts from rest and travels a distance of 's' m in 2 seconds?
Option A:	$(2/3)s \text{ m/s}^2$
Option B:	$(3/2)s \text{ m/s}^2$
Option C:	$(1/3)s \text{ m/s}^2$
Option D:	$(s/2) \text{ m/s}^2$
Q18.	<p>Given here is a velocity-time graph of the motion of a body. What is the distance travelled by the body during the motion?</p> 
Option A:	$1/2(OA+AB) \times BC$
Option B:	$1/2(OA+BC) \times OC$
Option C:	$1/2(OC+AB) \times AD$
Option D:	$1/2(AD+BE) \times OC$
Q19.	An aeroplane flying 490 m above ground level at 100 m/s, releases a block. How far on the ground will it strike?
Option A:	2 km
Option B:	0.1 km
Option C:	1 km
Option D:	0.2 km

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Q20.	A block is displaced by 3 m when a force of 200 N is applied on it on a smooth inclined surface which is at an angle of 50 degrees with the horizontal. What is the work done? (Use Work Energy Principle)
Option A:	385.67 Nm
Option B:	459.62 Nm
Option C:	933.00 Nm
Option D:	960 Nm
Q21.	What is the magnitude of the resultant force when $F_1 = 60j + 80k$ and $F_2 = 50i - 100j + 100k$ ?
Option A:	188unit
Option B:	191unit
Option C:	181unit
Option D:	120 unit
Q22.	A lead ball strikes a wall and falls down, a tennis ball having the same mass and velocity strikes the wall and bounces back. Check the correct statement.
Option A:	The lead ball suffers a greater change in momentum compared with the tennis ball
Option B:	The tennis ball suffers a greater change in momentum as compared with the lead ball
Option C:	The momentum of the lead ball is greater than that of the tennis ball
Option D:	Both suffer an equal change in momentum
Q23.	A metal ball falls from a height of 32 metres on a steel plate. If the coefficient of restriction is 0.5 to what height will the ball rise after the second bounce
Option A:	4 m
Option B:	8 m
Option C:	2 m
Option D:	16 m
Q24.	In the given figure, the tension in the horizontal cord is 30 N. What is the weight $W$ and tension in the string $OA$ in newton? 
Option A:	$30\sqrt{3}, 30$
Option B:	$60\sqrt{3}, 30$
Option C:	$30\sqrt{3}, 60$
Option D:	$60\sqrt{3}, 60$

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Q25.	<p>A 30 kg iron block is suspended using supports A and B as shown in the figure. What is the tension in both ropes?</p> 
Option A:	263.566 N and 215.2 N
Option B:	463.566 N and 415.2 N
Option C:	663.566 N and 615.2 N
Option D:	863.566 N and 815.2 N