Hall Ticket Number:

Code No. : 12032 (A)

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (CBCS) II-Semester Main Examinations, January-2021

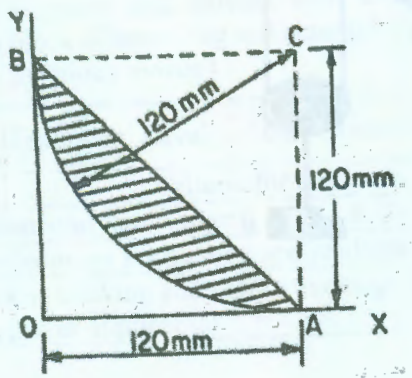
Engineering Mechanics

(Common to Civil, EEE & Mech.)

Time: **2** hours Max. Marks: **60**

*Note: Answer any **NINE** questions in **Part-A** and any **THREE** from **Part-B***

Part-A (9 × 2 = 18 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Show that Product of Inertia about its axis of symmetry is Zero	2	2	1	1
2.	Find the radius of gyration of a circular section of radius '80mm'	2	2	1	1
3.	What is general plane motion?	2	1	2	2
4.	Differentiate between rectilinear and curvilinear motion	2	1	2	1
5.	State D'Alembert's principle	2	1	3	2
6.	Define instantaneous center of rotation	2	2	3	1
7.	State the principle of work energy in rotation with formula	2	2	4	2
8.	Determine the work done in pulling a block of wood weighing 10kN for a length of 5m on a smooth inclined plane which makes 30° with the horizontal.	2	2	4	2
9.	Define co-efficient of restitution	2	1	5	2
10.	What do you mean by impact of elastic bodies?	2	2	5	1
11.	Determine the mass moment of a right circular cylinder of height 'H' and radius 'R' about axis of symmetry.	2	2	1	2
12.	Differentiate between Kinematics and Kinetics	2	1	2	2
	Part-B (3 × 14 = 42 Marks)				
13. a)	Find the Moment of Inertia of a solid sphere of mass 'M' and radius 'R' about its centroidal axis.	6	2	1	1
b)	Find the Product of inertia of a shaded area about 'XY' axis for the figure as shown below 	8	4	1	2

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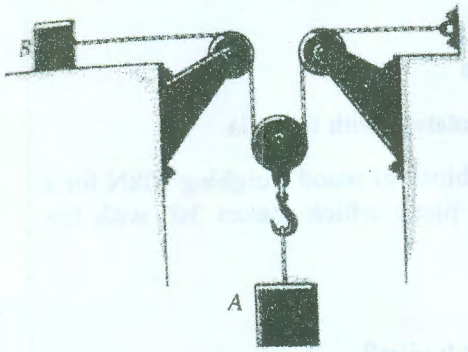
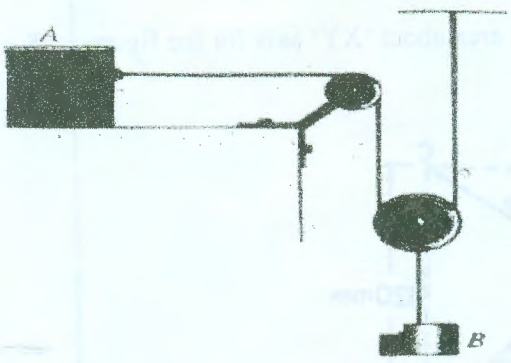
14. a)	A stone is dropped into a well. The sound of the splash is heard 3.30 seconds later. How far below the ground is the surface of water in the well? . Assume the velocity of sound as 333m/s	6	3	2	2
b)	A ball is thrown so that is just clears a 6 m wall 21 m away. If it left the hand 1.50m above the ground and at an angle of 60° to horizontal, what was the initial velocity of the ball?	8	2	3	2
15. a)	A ladder AB, 5m long, rests at a point A (0, 4) on a smooth wall and at appoints B (3, 0) on a smooth floor. Determine the coordinates of the instantaneous center of rotation, if B moves to the right.	2	2	3	2
b)	The 30N block B is rest on a smooth horizontal surface. Determine the acceleration of 20N block A is released from rest. 	12	3	3	2
16. a)	A stiffness of 30N/mm is pulled from an extension of 2mm to an extension of 5mm. Calculate the work done.	2	2	4	2
b)	Block A and B have masses of 20kg and 10kg respectively. Find the velocity of block B after it has moved 1m from rest. Take coefficient of kinetic friction as 0.2 between block A and horizontal surface. 	12	2	4	2

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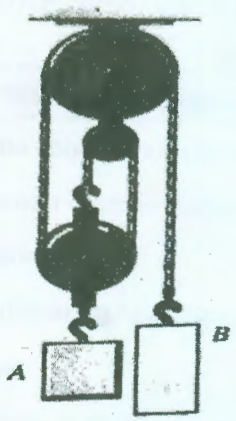
17. a)	State and prove impulse momentum equation.	2	2	5	1
b)	Blocks A and B have masses of 10kg and 15kg respectively. Determine the time taken by block B to move 5 seconds from rest. 	12	4	5	2
18. a)	A solid right circular cylinder made of lead which is mounted with a solid hemisphere made of steel on its top. If lead weigh 11400 kg/m3 and steel weighs 7860kg/m3. Find the mass moment of inertia of the assembly about its vertical centroidal axis.	7	2	1	2
b)	A balloon rises from the ground with a constant acceleration $3m/s^2$, five seconds later a stone is thrown vertically up from the launching pad. Calculate the minimum velocity of stone for it to just touch the balloon.	7	3	2	2
19.	Answer any ***two*** of the following:				
a)	A lift operates under a maximum of 8 person's mass of the lift is 800 kg. Determine the limits of tension if the lift accelerates at a constant rate of 1.2 m/s^2 either upwards or downwards. Take average weight of a person as 700N.	7	5	3	2
b)	A body of weight 600 N moves on a level horizontal surface for a distance of 30m with a force of 100 N applied to body at an angle of 30° to horizontal. Find the work done taking coefficient of kinetic friction as 0.2	7	2	4	2
c)	A bullet of mass 30 grams and moving with a velocity of 630 m/s penetrates a wooden block of mass 3 kg and emerges with a velocity of 180 m/s. How long does the block moves?	7	3	5	2

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	54.3
2	Knowledge on application and analysis (Level-3 & 4)	40.3
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	5.4

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