Question Paper Code: R22A12ME01

R22

ANURAG Engineering College

(An Autonomous Institution)

I B.Tech II Semester Supplementary Examinations, Jan/Feb-2024

APPLIED MECHANICS

(CIVIL ENGINEERING)

Time: 3 Hours **Max. Marks: 60**

Section – A (Short Answer type questions) (10 Marks)

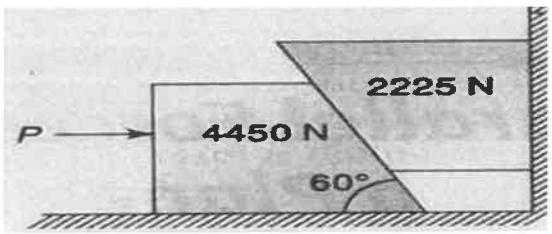
Answer All Questions		Course Outcome	B.T Level	Marks
1.	How do you specify a Force	CO1	L1	1M
2.	Define Free Body Diagram	CO1	L1	1M
3.	What are the types of Friction?	CO2	L1	1M
4.	State Theorms of Pappus	CO2	L1	1M
5.	What is polar moment of inertia?	CO3	L1	1M
6.	What is the significance of radius of gyration?	CO3	L1	1M
7.	Define Newton's second law and give the formulae for rectangular, polar and path coordinates.	CO4	L1	1M
8.	What is Direct and Oblique Impact?	CO4	L1	1M
9.	What is the Difference between Kinematics and Kinetics?	CO5	L1	1M
10.	State D'Alembert principle	CO5	L1	1M

Section B (Essay Questions)

Answer all questions, each question carries equal marks. **(5 X 10M = 50M)**

11. A)	The following forces act at a point. i) 20 N inclined at 30^0 towards North of East. ii) 25 N towards North iii) 30N towards North West, and iv) 35N inclined at 40^0 towards south of west. **Find** the Magnitude and Direction of the resultant force.	CO1	L3	10M
	OR			
B)	State and **prove** Varigon's theorm.	CO1	L3	10M
12. A)	Reference to Fig.1, the coefficients of friction are as follows: 0.25 At the floor, 0.30 at the wall, and 0.20 between blocks. **Find** the **minimum** value of a horizontal force P applied to the lower block that will hold the system in equilibrium.	CO2	L3	10 M

Fig.1



OR

B)	Reference to Fig.2, **determine** the coordinates x_c and y_c of the center of a 100 mm diameter, circular hole cut in a thin plate so that this point will be the centroid of the remaining shaded area.	CO2	L3	10M

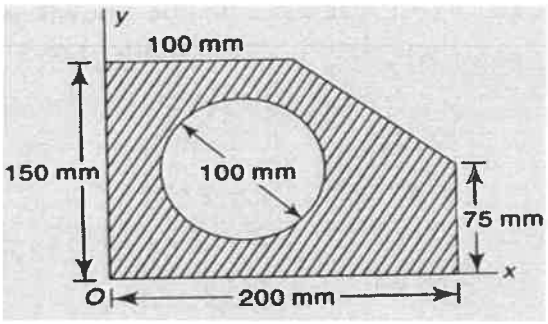


Fig.2

13. A)	**Find** the area moment of inertia about the centroidal axes for a given area shown in Fig:3	CO3	L3	10M

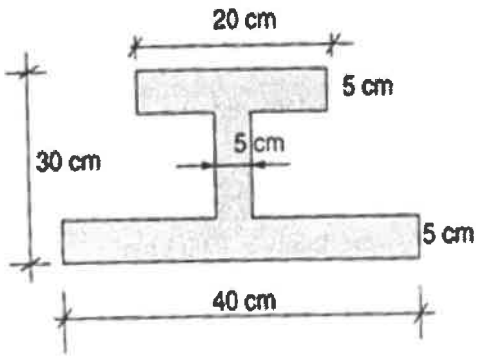


Fig.3

OR

B)	**Determine** the mass moment of inertia of a uniform rod of length L about its: i) centroidal axis normal to rod, and ii) axis at the end of the rod and normal to it.	CO3	L3	10M
14. A)	A particle moves along a path $r = 2\Theta$ with time $\Theta = 5\ t^2$, where t is in seconds and Θ is in radians. **Determine** the velocity of the particle when $\Theta = 75^0$	CO4	L3	10M

OR

B)	The two spherical balls A and B are travelling on a horizontal line with velocities of 10m/s and 4m/s respectively from left to right. Initially the ball B is to right of A by 30m. The weight of balls A and B are 30N and 50N respectively. Find i) When and where they will collide ii) If the coefficient of restitution is 0.5, **Find** their velocities after impact.	CO4	L3	10M

15. A)	**Determine** the constant force P to be given for the system of forces shown in Fig. 4 to attain a velocity of 3m/sec after moving 4.5 m from rest. Coefficient of friction between the blocks and plane is 0.3. Pulleys are smooth.	CO5	L3	10M

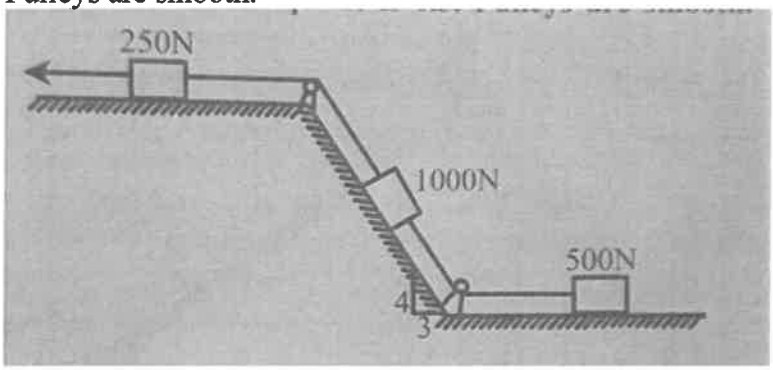


Fig.4

OR

B)	A homogeneous cylinder of 100 mm radius has a mass of 0.5 Kg. The cylinder rolls without slipping on a horizontal surface with a translational velocity of 25 cm/s. **Determine** its total kinetic energy.	CO5	L3	10M