

ANURAG Engineering College

(An Autonomous Institution)

I B.Tech II Semester Supplementary Examinations, June/July-2024

APPLIED MECHANICS

(CIVIL ENGINEERING)

Time: 3 Hours

Max. Marks: 60

Section – A (Short Answer type questions)

(10 Marks)

Answer All Questions

1. Define Rigid Body.
2. What are the different types of Force Systems?
3. Mention any two advantages and disadvantages of Friction.
4. What is the significance of Centroid or Centre of Gravity?
5. If Moment of Inertia is higher for one body compared to another, what do you understand based on it?
6. What is Product of Inertia about symmetric axis?
7. Distinguish between rectilinear motion and curvilinear motion.
8. Write the Impulse Momentum Equation?
9. Define Instantaneous Centre of Rotation.
10. State D'Alembert principle.

Course Outcome	B.T Level	Marks
CO1	L1	1M
CO1	L1	1M
CO2	L1	1M
CO2	L1	1M
CO3	L1	1M
CO3	L1	1M
CO4	L2	1M
CO4	L1	1M
CO5	L1	1M
CO5	L1	1M

Section B (Essay Questions)

Answer all questions, each question carries equal marks.

(5 X 10M = 50M)

11. A) Three forces of magnitudes P, 100 N and 200 N are acting at a point O as shown in Fig.1. **Determine** the magnitude and direction of the force P.

CO1 L3 10M

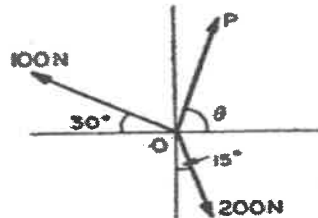


Fig.1

OR

- B) If the force multiplier of a force P acting from A to E is $P_m = 40\text{N/m}$, referring Fig.2. **Find** out the following
- i) Component of P along AC
 - ii) Moment of P about D

CO1 L3 10M

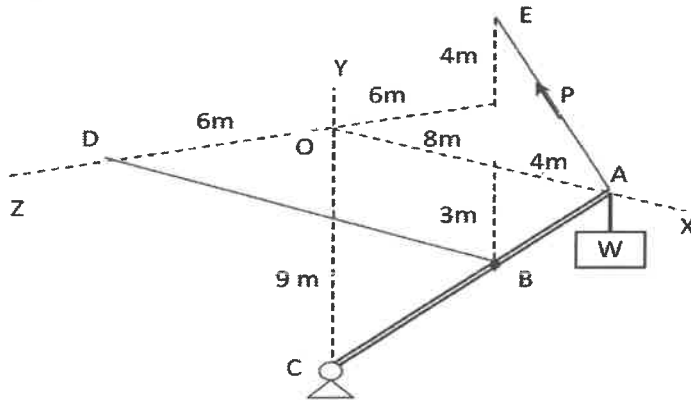


Fig.2

12. A) i) **Mention** the Coulomb’s laws of friction and **State** the laws of friction. CO2 L3 2M
 ii) **Prove** that angle of repose is same as the value of limiting angle friction? 2M
 iii) **Write** short notes on a) cone of friction b) Angle of repose c) Angle of friction 6M

OR

- B) A semi-circular area is removed from a trapezium as shown in Fig.3 (dimensions in mm). **Determine** the centroid of the remaining area (shown hatched). CO2 L3 10M

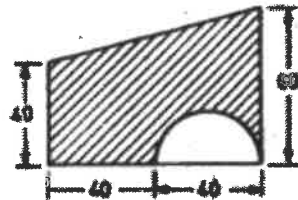


Fig.3

13. A) State and **prove** parallel axis theorem CO3 L3 10M

OR

- B) **Derive** the mass moment of inertia of a right circular cone with respect to an axis through the apex of the cone and perpendicular to its longitudinal axis. CO3 L3 10M

14. A) The position of a particle moving along a straight line is defined by the relation $x=t^3-9t^2+15t+18$ where x is expressed in metre m and t in seconds. **Determine** the time, position, and acceleration of the particle when its velocity becomes zero? CO4 L3 10M

OR

- B) A ball of mass 100gm is moving towards a bat with a velocity of 25m/s as shown in the figure.4. When hit by the bat, the ball attains a velocity of 35m/s . If the ball and bat are in contact for a period of 0.02 sec, **Determine** the average impulse force exerted by the bat on the ball during the impact. CO4 L3 10M

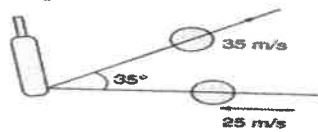


Fig.4

15. A) **Find** the velocity of B Shown in Fig.5 by Instantaneous Centre method CO5 L3 10M

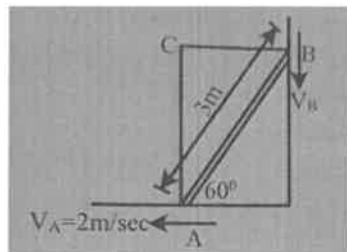


Fig.5

OR

- B) **Derive** the equation for motion of connected bodies? CO5 L3 10M