MAY 2023 **U/ID 32511/UCM4B**

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer any TEN questions.

1. State Hooke's law.

2. Define moment of a force.

3. Define couple.

4. What do you mean by virtual work?

5. Define potential energy.

6. Define phase and epoch.

7. Define projectile.

8. What do you mean by impulsive force?

9. Define conical pendulum.

10. Write down the equation of the conic.

11. Define centre of force.

12. Define moment of inertia.

PART B — ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

13. Show that if three forces keep a particle in equilibrium, then the forces are coplanar.

14. Show that the forces $\overline{AB}, \overline{CD}, \overline{EF}$ acting respectively at A, C, E of regular hexagon ABCDEF, are equivalent to a couple of moment equal to the area of the hexagon.

15. Show that with usual notation

    (a) $v = u + at$

    (b) $s = ut + \frac{1}{2}at^2$

    (c) $v^2 = u^2 + 2as$

16. Show that the parts of the projectile is a parabola.

17. Find a uniform motion of a cyclist on a rough circular path.

18. State and prove parallel axis theorem.

19. State Newton's laws of motion.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

20. State and prove Lami's theorem.

21. State and prove principal of virtual work.

22. In a SHM, show that the sum of the K.E. and P.E. is a constant.

23. Find the velocities of two smooth spheres after a direct impact between them.

24. Obtain the equation of a central orbit in polar coordinates.

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