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**DHANALAKSHMI SRINIVASAN COLLEGE
OF ARTS & SCIENCE FOR WOMEN
(AUTONOMOUS)**



(For Candidates admitted from 2018-2019 onwards)

UG DEGREE EXAMINATIONS APRIL – 2021

**B.SC – MATHEMATICS
DYNAMICS**

Time: 3 Hrs

Max.Marks: 75

PART – A

CHOOSE THE CORRECT ANSWER.

(10*1=10)

- Total distance divided by total time equals
a) Average speed b) momentum c) Acceleration d) Instantaneous speed
- The displacement of a body is a-----
a) Scalar b) Vector c) Scalar and Vector d) None
- A particle projected into the air in any direction and with any velocity such a particle to called a
a) Projectile b) Velocity c) Direction d) None
- The maximum horizontal range is -----
a) u^2/g b) u/g c) $2u$ d) u^2
- A solid body has a.....shape
a) Definite b) Infinite c) Finite d) None
- A body does not come to its original shape is said to be
a) Perfectly elastic b) Perfectly Inelastic
c) Impinge directly d) Impinge obliquely
- Given Example of SHM _____
a) Pendulum b) violin c) Both (a)and(b) d) none of these
- The periodic time of $P=$ _____
a) $\sqrt{2\Pi/\mu}$ b) $2\Pi/\sqrt{\mu}$ c) 0 d) 1
- The magnitude of radial component of velocity is
a) \dot{r} b) \ddot{r} c) $r\dot{\theta}$ d) $r\ddot{\theta}$
- In certain curves the relation between p and r is very simple. Such the relation is called
a) Polar equation b) pedal equation
c) Equation of rectangular d) equiangular spiral

PART – B

ANSWER ALL THE QUESTIONS

(5*7=35)

11. a) State and prove the parallelogram law

(OR)

b) Two man walking along a level road at 5km/h, the rain appears to be beating into his face at 8 km/h at an angle 60° with the vertical. Find the true direction and velocity of the rain.

12. a) To Show that the path of the projectile is a parabola

(OR)

b) Find the velocity of the projectile in magnitude and direction at the end of time.

13. a) A particle falls from a height h upon a fixed horizontal plane, if e be the coefficient of restitution, show that the whole distance described before the particle has finished rebounding is

$$h \left(\frac{1+e^2}{1-e^2} \right)$$

(OR)

b) Oblique impact of two smooth spheres.

14. a) General solution of the simple harmonic motion equation

(OR)

b) Composition of two simple harmonic motions of the same period and in the same straight line.

15. a) The velocities of a particle along and perpendicular to a radius vector from a fixed origin are λr^2 and $\mu \theta^2$. where μ and λ are constants . Show that the equation to the path of the particle is

$\frac{\lambda}{\theta} + c = \frac{\mu}{\theta^2}$ where c is a constant. Show also that the accelerations along and perpendicular to the radius are $2\lambda^2 r^2 - \frac{\mu^2 \theta^2}{r}$ and $\mu(\lambda r \theta^2 + \frac{2\mu \theta^3}{r})$

(OR)

b). Write a note on equiangular spiral

PART – C

ANSWER ANY THREE QUESTIONS

(3*10=30)

16. Describe the motion in a straight line under uniform acceleration.

17. Characteristics of the motion of a projectile.

18. Write down loss of kinetic energy due to direct impact of two smooth spheres.

19. Show that the resultant of two simple harmonic motions in the same direction and of equal periodic time, the amplitude of one being twice that of the other and its phase a quarter of a period in advance, is a simple harmonic motion of amplitude $\sqrt{5}$ Times that of the first and whose is an advance of the first by $\frac{\tan^{-1} 2}{2\pi}$ of a period.

20. State and prove pedal equation of the central orbit.