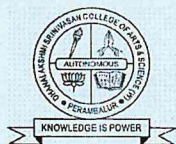


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**DHANALAKSHMI SRINIVASAN COLLEGE
OF ARTS & SCIENCE FOR WOMEN
(AUTONOMOUS)**



(For Candidates admitted from 2020-2021 onwards)

UG DEGREE EXAMINATIONS APRIL – 2021

B.SC PHYSICS

MECHANICS AND RELATIVITY

Time: 3 Hrs

Max.Marks: 75

PART - A

CHOOSE THE CORRECT ANSWER

(10 X 1 = 10)

- The tendency of the ductile materials act as brittle is known as
 - Compaction
 - Brazing
 - Tempering
 - Notch sensitivity
- At the highest point of a projectile, its velocity and acceleration are at an angle of
 - 0
 - 45
 - 90
 - 80
- What is the formula for radius of gyration?
 - $K^2 = I/A$
 - $K^2 = I^2/A$
 - $K^2 = I^2/A^2$
 - $K^2 = (I/A)^{1/2}$
- What is MOI?
 - ml^2
 - mal
 - ar^2
 - None of the mentioned
- Which of the following apparatus is used to find the moment of inertia of an object?
 - Simple pendulum
 - Bifilar Suspension
 - Compound pendulum
 - spring pendulum
- The total energy of a particle executing simple harmonic motion is
 - αX
 - αX^2
 - independent of X
 - $\alpha \sqrt{X}$
- Bernoulli's principle is derived from which of the following?
 - Conservation of mass
 - Conservation of energy
 - Newton's law of motion
 - Conservation of momentum
- constraints are time dependent
 - Holonomic
 - Non-Holonomic
 - Scleronomous
 - Rhenomous
- If the objects reaches the speed of light, it's length changes to
 - Infinite
 - double of value
 - Half of the value
 - zero
- The basic theorem / principle used to obtain mass-energy relation is
 - Heisenberg's uncertainty principle
 - Work-energy theorem
 - Momentum conservation theorem
 - Maxwell theorem

PART-B

ANSWER ALL THE QUESTIONS

(5 X 7 = 35)

11. a) State and explain the laws of impact.

(OR)

b) Derive an expression for direct impact between two smooth spheres.

12. a) Obtain the kinetic energy of a body rotating about a fixed axis.

(OR)

b) Find the moment of inertia of a spherical shell.

13. a) Derive the equation for simple harmonic motion.

(OR)

b) Discuss briefly the average values of kinetic and potential energies of a harmonic oscillator.

14. a) What are the Constraints? Explain different types of constraints with example.

(OR)

b) Derive Euler's equation for flow for liquids. Hence derive Bernoulli's equation.

15. a) Write a short note on frames of reference according to the theory of relativity.

(OR)

b) Obtain an expression for relativistic variation of mass with velocity.

PART - C

ANSWER ANY THREE QUESTIONS

(3 X 10 = 30)

16. Prove that the path of a projectile is a parabola.

17. Find the moment of inertia of a hollow sphere.

18. Derive an expression for a period of oscillation of a bifilar pendulum.

19. State and prove the laws of conservation of linear momentum, angular momentum and energy for a system of interacting particles.

20. Explain with a neat sketch the Michelson-Morley experiment. Explain the negative results obtain in Michelson and Morley experiments.