

53141



I SEMESTER B.Sc. EXAMINATION – MARCH/APRIL 2022

SCHEME: SEMESTER- CBCS

PHYSICS-PAPER-I

MECHANICS, PROPERTIES OF MATTER AND
ELECTROSTATICS

021

Time: 03 Hours

Max Marks: 80

Instructions: Answer any Two questions from Part-A and Part-B,

Three questions from Part-C and Ten questions from Part-D

PART-A

Answer any TWO questions.

2x12=24

1. (a) Write a note on centrifugal force. 04
(b) Obtain an expression for centripetal force for a particle executing uniform circular motion. 08
2. (a) Obtain the expression for the moment of inertia of a uniform cylinder about an axis passing through the center and perpendicular to its axis. 06
(b) Show that in an oblique elastic collision of a body with another body of equal mass at rest, the two bodies move away perpendicular to each other after collision. 06
3. (a) Obtain the conditions for minimum and maximum time periods of oscillation in case of a compound pendulum. 04
(b) Derive the relation $\frac{d\vec{A}}{dt} = \frac{1}{2}r^2\dot{\theta}\hat{n}$, where the symbols have their usual meaning. 04
(c) Distinguish between conservative and non-conservative force. Give an example for each. 04

PART-B

Answer any TWO questions.

2x12=24

4. (a) Define coefficient of viscosity. Mention its S.I unit. 05
(b) Give the theory of torsional pendulum. 07
5. (a) Establish the relation $q = 2\eta(1 + \sigma)$ where q , η and σ are the Young's modulus, Rigidity modulus and Poisson's ratio of the material respectively. 07
(b) Describe with necessary theory the method of determining the surface tension of a liquid by drop weight method. 05
6. (a) Describe the construction and working of attracted disc electrometer. 06
(b) Give the theory of Helmholtz double coil Galvanometer. 06

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PART-C

Answer any **THREE** questions.

3x4=12

- 7 Earth has an orbital period of 365 days and its mean distance from the Sun is 1.495×10^8 km. Pluto's mean distance from the Sun is 5.986×10^9 km. Using Kepler's third law, calculate Pluto's orbital period.
- 8 What amount of energy will be liberated if 1000 droplets of water each 10^{-8} m in diameter coalesce to form one large special drop. Given surface tension of water = 72×10^{-3} N/m.
- 9 A load of 150g is suspended at free end of a cantilever of length 1 m having thickness of 2×10^{-3} m and breadth 2×10^{-2} m. Calculate the depression produced at the free end, if the Young's modulus of the material is 20×10^{10} Nm⁻². Take $g = 9.8$ ms⁻².
- 10 A Rocket of mass 5000 kg is fired vertically upward from a place at the equator with a velocity of 1200 ms⁻¹. If the angular velocity of the earth is 7.3×10^{-5} rad s⁻¹, calculate the Coriolis force acting on it.

PART-D

Answer any **TEN** questions.

10x2=20

- 11 (a) What is a fictitious force? Give an example.
- (b) Write down Galilean transformation equations.
- (c) Why attracted disc electrometer is called absolute electrometer?
- (d) Distinguish between elastic and inelastic collision with examples.
- (e) What is escape velocity? Explain.
- (f) State parallel axis theorem.
- (g) Mention any two conditions satisfied by a geostationary satellite.
- (h) Discuss the effect of pressure on viscosity of a liquid.
- (i) What are the values of angle of contact in case of (i) water on glass and (ii) Mercury on glass?
- (j) Poisson's ratio should be less than $\frac{1}{2}$. Justify.
- (k) In moving coil Galvanometer, the observed throw is less than the actual throw. Give reasons.
- (l) Mentions the factors on which the current sensitivity of a moving coil galvanometer depends upon.

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