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Roll No. [redacted] *to be filled in by the candidate.*

Inter. (Part-I)-A-2022

Physics (Objective Type) **(For all Sessions)** **Paper Code 6 4 7 4**

Time: 20 Minutes **Group-II** Rwp G2-22 **Marks:17**

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank.

1. 1. Venturi meter is a device used to measure:
(A) Pressure of fluid (B) speed of fluid (C) Density of fluid (D) Viscosity of fluid

2. 1 radian is equal to:
(A) 45° (B) 60° (C) 57.3° (D) 73.3°

3. If moment of inertia of a body becomes double, then angular momentum becomes:
(A) One half (B) Doubled (C) Three times (D) Four times

4. The product of frequency (f) and time period (T) is equal to:
(A) 2.5 (B) 0.5 (C) 2 (D) 1

5. If organ pipe is open at both ends, the frequency of fundamental harmonic is:
(A) $\frac{v}{2l}$ (B) $\frac{2v}{l}$ (C) $\frac{v}{4l}$ (D) $\frac{4v}{l}$

6. The speed of sound in air is 332 m/s at Oc°. Its speed at 2C° is:
(A) 331.22 m/s (B) 332.22 m/s (C) 333.22 m/s (D) 332 m/s

7. Colourful pattern produced by a thin soap film is due to ________ of light:
(A) dispersion (B) polarization (C) diffraction (D) interference

8. Magnification of simple microscope can be expressed as:
(A) 1 + f/d (B) 1 – f/d (C) 1 + d/f (D) 1 – f/d

9. For an adiabatic process, first law of thermodynamics takes the form:
(A) $Q = \Delta U + W$ (B) $Q = W$ (C) $Q = \Delta U$ (D) $W = -\Delta U$

10. If the temperature of sources is two times the temperature of sink, the efficiency of heat engine will be:
(A) 0.2 (B) 0.3 (C) 0.5 (D) 1

11. $\left[M^{o}LT^{-2}\right]$ are the dimensions of:
(A) Force (B) Velocity (C) Pressure (D) Acceleration

12. The number 0.00320 can be expressed in scientific notation as:
(A) 3.20×10^{-2} (B) 3.20×10^{-4} (C) 3.20×10^{-3} (D) 3.20×10^{3}

13. $(\hat{i} \times \hat{j}).\hat{k}$ is equal to:
(A) 1 (B) 0 (C) $\hat{i}$ (D) $\hat{K}$

14. Cross product of two antiparallel vectors $\vec{A}$ and $\vec{B}$ is:
(A) $AB\cos\theta$ (B) AB (C) 0 (D) -AB

15. The quantity impulse has the same units as that of:
(A) Force (B) Momentum (C) Power (D) Work done

16. The speed of the gases ejected by a typical rocket is:
(A) 3900 m/s (B) 4100 m/s (C) 4000 m/s (D) 4200 m/s

17. Which force is non – conservative force?
(A) Gravitational (B) Frictional (C) Electric (D) Magnetic

Physics (Essay Type) **(For All Sessions)**
Time: 2:40 Hours **Group-II** **Marks: 68**

Note: Section I is compulsory. Attempt any THREE (3) questions from Section II.

SECTION – I

RwP 92-22

2. Write short answers to any EIGHT questions. **(2 x 8 = 16)**

i. What are rule for zero to be a significant figure?
ii. What are dimensions of angular momentum and torque?
iii. A light year is distance light travel in one year. How many meters are there in one light year? (speed of light = 3×10^8 ms^{-1})
iv. How many seconds are in one year?
v. Can velocity of an object reverse direction when acceleration is constant? If so, give an example.
vi. Find change in momentum for an object subjected to a given force for a given time and state law of motion in terms of momentum.
vii. Find angle of projection of a projectile when its horizontal range is twice the maximum height.
viii. Derive Newton's 1st Law of motion from the second Law of motion.
ix. What are environmental crisis we are facing due to direct impact of thermodynamics.
x. Prove that $<v^2>=\frac{3P}{l}$
xi. Explain that the average velocity of molecules in gas is zero but average of the square of velocities is not zero.
xii. Give an example of process in which no heat is transferred to or from the system but the temperature of system changes.

3. Write short answers to any EIGHT questions. **(2 x 8 = 16)**

i. If all the components of the vectors $\overrightarrow{A_1}$ and $\overrightarrow{A_2}$ were reversed, how would this alter $\overrightarrow{A_1} \times \overrightarrow{A_2}$
ii. How would you keep torque constant by varying moment arm and force. Support your answer with reasons.
iii. What data would you use to evaluate maximum cross product with minimum dot product and vice versa?
iv. A boy uses catapult to throw a stone which accidentally smashes a green house window. List the possible energy changes.
v. What is the special case of law of conservation of energy? Support your reason with an equation.
vi. Define escape velocity. Which one of the planet has the highest value of escape velocity?
vii. Show that orbital angular momentum Lo = mvr
viii. Determine the rotational KE of a disc.
ix. How would you made a distinction between spin angular momentum and orbital angular momentum? Support you distinction by considering the moment of inertia of a body.
x. Why the polaroid sun glasses are better than ordinary sun glasses?
xi. What is the precision of Michelson's interferometer and how Michelson redefine meter with his experiment.
xii. Why the central spot of Newton's rings is dark? Also make a diagram of this experiment.

4. Write short answers to any SIX questions. **(2 x 6 = 12)**

i. Two row boats moving parallel in the same direction are pulled towards each other. Explain.
ii. What is the total distance travelled by an object moving with SHM in a time equal to its period, if its amplitude is A?
iii. What is Second Pendulum? Find its frequency.
iv. What is meant by sharpness of resonance?
v. Explain why sound travels faster in warm air than in cold air?
vi. What is the Principle of super position?
vii. What is effect of temperature on speed of sound?
viii. How the power is lost in optical fibre through dispersion? Explain.
ix. What is least distance of distinct vision?

SECTION - II

Note: Attempt any THREE (3) questions from Section II.

5. (a) Define torque. Explain in the case of rigid body. (5)
(b) How large a force is required to accelerate an electron (m = 9.1×10^{-31} Kg) from rest to a speed of 2.0×10^7 ms^{-1} through a distance of 5.0cm? (3)

6. (a) Define artificial gravity and prove the relation $f=\frac{1}{2\wedge}\sqrt{\frac{g}{R}}$ (5)
(b) A hose pipe ejects water at a speed of 0.3 ms^{-1} through a hole of area 50cm^2. If the water strikes a wall normally, calculate the force on the wall, assuming the velocity of water normal to the wall is zero after striking. (3)

7. (a) Derive Bernoulli's equation for an ideal fluid. Also state Bernoulli's relation. (5)
(b) The wave length of signals from a radio transmitter is 1500m and the frequency is 200 KHz. What is the wavelength for a transmitter operating at 1000 KHz and with what speed the radio waves travel? (3)

8. (a) Describe the principle, construction and working of "Michelson's interferometer". How can you find the wave length of monochromatic source of light? (5)
(b) A load of 15.0 g alongates a spring by 2.0 cm. If body of mass 294 g is attached to the spring and is set into vibrations with an amplitude of 10.0 cm. What will be its time period? (3)

9. (a) Describe the construction and working of compound microscope. Also derive the relation for its magnifying power. (5)
(b) The turbine in a steam power plant takes steam from a boiler at 427°C and exhausts into a low temperature reservoir at 77°C. What is the maximum possible efficiency? (3)

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