Roll No. : 137811

140 / 227

Objective

Paper Code

6475

Intermediate Part First

PHYSICS (Objective) GROUP - I

Time: 20 Minutes Marks: 17

Q.No.1 You have four choices for ea... which you think is correct, fill the relevant circle in front of th... marker or pen to fill the circles. Cutting or filling two or mo... pt as many questions as given in objective type question pape...

S.#	Questions	A	B	C	D
1	Centripetal force performs:	Positive work	No work	Negative work	Maximum work
2	For one radian, arc length 'S' and radius 'r' of circle has the relation:	$S > r$	$r > S$	$S = r$	$S = 2r$
3	Solar energy at normal incidence outside the Earth's atmosphere is:	$1.0 Wm^{-2}$	$1.4 Wm^{-2}$	$1.0 kWm^{-2}$	$1.4 kWm^{-2}$
4	Water flows out from a pipe at $3 Kgs^{-1}$ and its velocity changes from $5 ms^{-1}$ to zero on striking the ball, then force is:	10 N	15 N	20 N	25 N
5	What is the distance travelled by a body in the following velocity time graph? 	100 m	20 m	10 m	5 m
6	Two vectors to be combined have magnitudes 60N and 35N with different directions. Pick the correct answer:	95 N	25 N	Both A & B	Can be any value between option A & B
7	The distance of point P of position vector $\vec{r} = 3\vec{i} + 3\vec{j} + 3\vec{k}$ from the origin is:	3.0 unit	6.4 unit	5.2 unit	2.5 unit
8	What choice would you have to pick for the percentage uncertainty in measuring 2.3cm with meter rod and 2.45cm with vernier calliper?	4.3% and 0.4%	4.0% and 0.1%	0.1% and 0.01%	3.9% and 0.52%
9	How many number of zeros in 7.4000 and 8000 kg are significant, if the later quantity has 1 kg least count?	None and none	Three and three	Three and two	Two and one
10	Pick the correct condition for the relation $C_P - C_V = R$:	Internal energy is kept constant for both processes	Pressure is kept constant for both processes	Temperature is kept constant for both processes	Volume is kept constant for both processes
11	When the work is done at the cost of internal energy, then the equation becomes:	$W = \Delta U$	$W = Q$	$W = -\Delta U$	$W = \Delta V$
12	For incident angles equal to or greater than the critical angle, the glass-air boundary will act as:	Lens (Biconvex)	Mirror (Plane)	Lens (Concave)	Lens (Plano convex)
13	When fringe spacing in Young's double slit experiment is increased by increasing wavelength then number of fringes will be:	Decreased	Increased	Constant	Disappear
14	When air column is closed from one end then the fundamental frequency becomes:	$1.0\left(\frac{v}{\ell}\right)$	$0.5\left(\frac{v}{\ell}\right)$	$0.75\left(\frac{v}{\ell}\right)$	$0.25\left(\frac{v}{\ell}\right)$
15	If a wave is travelling in a rarer medium and incident on a denser medium then the phase change is:	360°	180°	90°	0°
16	Which other quantity has the same unit as spring constant has Nm^{-1}?	Torque	Momentum	Surface tension	Rotational K.E
17	Which one is correct?	1 torr = $13.33 Nm^{-2}$	2 torr = $26.66 Nm^{-2}$	5 torr = $65.65 Nm^{-2}$	10 torr = $1333 Nm^{-2}$

Roll No. _____

PHYSICS (Subjective) GROUP - I

Time: 02:40 Hours Marks: 68

SECTION – I

2. **Write short answers to any EIGHT parts.** 16

(i) The period of simple pendulum is measured by a stop watch. What type of errors are possible in the time period?
(ii) Write the dimensions of (a) pressure (b) density.
(iii) Given that $V = (5.2 \pm 0.1)$ volt. Find its percentage uncertainty.
(iv) What are supplementary units? Define only one unit.
(v) Under what circumstances would a vector have components that are equal in magnitude?
(vi) Suppose the sides of a closed polygon represent vector arranged head to tail rule. What is the sum of these vectors?
(vii) Define the two conditions of equilibrium.
(viii) Explain the circumstances in which the velocity $\vec{v}$ and acceleration $\vec{a}$ of a car are (a) anti-parallel (b) $\vec{v}$ is zero but $\vec{a}$ is not zero.
(ix) Define impulse and show that how it is related to linear momentum?
(x) What is isolated system? State the law of conservation of momentum.
(xi) What is the effect on the speed of a fighter plane chasing another when it opens the fire?
(xii) Explain the difference between laminar flow and turbulent flow.

3. **Write short answers to any EIGHT parts.** 16

(i) Calculate the work done in kilo joules in lifting a mass of 10kg (at steady velocity) through a vertical height of 10m.
(ii) What sort of energy is in the (a) compressed spring (b) water in high dam?
(iii) Define escape velocity. Write the formula to find escape velocity.
(iv) Why does a diver change his body positions before and after diving in the pool?
(v) When mud flies off the tyre of a moving bicycle, in what direction does it fly? Explain.
(vi) Show that $S = r\theta$
(vii) What is the total distance travelled by an object moving with simple harmonic motion in time equal to its period, if its amplitude is A?
(viii) Explain the relation between total energy, potential energy and kinetic energy of a body oscillating SHM.
(ix) Draw the graph between amplitude and time in damped oscillations.
(x) Explain the terms crest, trough, node and antinode.
(xi) Explain why sound travels faster in warm air than in cold air.
(xii) Speed of sound in air at 0°C is 332ms^{-1}. Find its speed at 15°C.

4. **Write short answers to any SIX parts.** 12

(i) How is the distance between interference fringes affected by the separation between the slits of Young's experiment? Can fringes disappear?
(ii) An oil film spreading over a wet footpath shows colours. Explain how does it happen?
(iii) Find the grating element of the diffraction grating containing 2000 lines / cm.
(iv) Explain briefly the single mode step index fiber.
(v) Why would it be advantageous to use blue light with a compound microscope?
(vi) Give at least two postulates of kinetic theory of gases.
(vii) Derive Boyle's law on the basis of kinetic theory of gases.
(viii) Give an example of a process in which no heat is transferred to or from the system but temperature of the system changes?
(ix) Is it possible to construct a heat engine that will not expel heat into the atmosphere? Explain.

SECTION – II

Attempt any THREE questions. Each question carries 08 marks.

5. (a) What is a scalar product? Discuss its physical interpretation and write its three characteristics. 05
(b) Ten bricks, each 6.0cm thick and mass 1.5kg lie flat on a table. How much work is required to stack them one on the top of another?

6. (a) State and explain law of conservation of linear momentum. 03
(b) A gramophone record turntable accelerates from rest to an angular velocity of 45.0 rev min^{-1} in 1.60s. What is its average angular acceleration? 05

7. (a) Define Stoke's law and show that the terminal velocity is directly proportional to square of radius of the water droplet. 03
(b) A heat engine performs 100J of work and at the same time rejects 400J of heat energy to the cold reservoirs. What is the efficiency of the engine? 05

8. (a) Discuss the motion of a horizontal mass spring system and find the values of time period, instantaneous displacement and instantaneous velocity. 03
(b) A pipe has a length of 1m. Determine the frequencies of the fundamental and the first two harmonics if the pipe is closed at one end. 05

9. (a) Explain diffraction of x-rays by crystals and derive Bragg's equation. 03
(b) A simple astronomical telescope in its normal adjustment has an objective of focal length 100cm and an eye piece of focal length 5.0cm (i) where is the final image formed (ii) calculate the angular magnification. 05