Q.No.1 You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number, on bubble sheet. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question.

S.#	QUESTIONS	A	B	C	D
1	The dimensions of centripetal force is:	$[ML^{-2}T^2]$	$[MLT^{-2}]$	$[ML^{-1}T^{-2}]$	$[ML^2T^{-2}]$
2	Absolute uncertainty in a measuring instrument is equal to:	Least count	Accuracy	Fractional uncertainty	Percentage uncertainty
3	$(\hat{i} \times \hat{j}) \cdot \hat{k} =$	0	−1	$\hat{k}$	1
4	Angle between two vectors $3\hat{i} + 4\hat{j}$ and $4\hat{i} - 3\hat{j}$ is:	30°	90°	60°	45°
5	When the body moves with constant acceleration, the velocity time graph is:	Parabola	Hyperbola	Straight line	Curve
6	If a mass of a body is doubled, then acceleration becomes:	Half	Double	One forth	Constant
7	Consumption of energy by a 60 watt electric bulb in 2 seconds is:		30 J	0.5 J	120 J
8	The rate of change of angular momentum is equal to:	Force	Rotational K.E	Torque	Impulse
9	A wheel of radius 4 m turns through an angle of 114.6°. It lays out a tangential distance:	4 m	8 m	458.4 m	28 m
10	The property of a fluid having constant density is called:	Compressible fluid	Non-ideal fluid	Turbulent fluid	Incompressible fluid
11	The K.E of a simple pendulum at equilibrium position is:	Maximum	Minimum	Zero	Medium
12	The types of waves are particularly useful for under sea communication and detection systems:	Radio waves	Microwaves	Ultrasonic waves	Infrared waves
13	Frequency range of hearing of dog is:	60 – 70,000 Hz	15 – 50,000 Hz	20 – 20,000 Hz	150 – 150,000 Hz
14	When light enters glass its suffers a change in:	Frequency only	Wavelength only	Velocity only	Both B and C
15	When the final image is formed at infinity, the magnification formula of simple microscope will be:	$1 + \dfrac{d}{f}$	$2 + \dfrac{d}{f}$	$\dfrac{d}{f}$	$\dfrac{f}{d}$
16	At constant temperature the graph between v and $\dfrac{1}{p}$ is:	Hyperbola	Straight line	Parabola	Semi circle
17	In irreversible process the entropy of system:	Increases	Decreases	Becomes zero	Remains constant

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PHYSICS PAPER-I GROUP-I

TIME ALLOWED: 2.40 Hours | **SUBJECTIVE** | **MAXIMUM MARKS: 68**

NOTE: Write same question number and its parts number on answer book, as given in the question paper.

SECTION-I MTN-11-1-23

2. Attempt any eight parts. 8 × 2 = 16

(i) The wavelength λ of a wave depends on the speed v of the wave and its frequency f. Knowing that $[\lambda] = [L]$, $[v] = [LT^{-1}]$ and $[f] = [T^{-1}]$. Decide which of the following is correct, $f = v\lambda$ or $f = v/\lambda$.

(ii) Give the drawbacks to use the period of pendulum as a time standard.

(iii) What rules should be followed in rounding of data?

(iv) Distinguish between Random error and Systematic error.

(v) If one of the rectangular components of a vector is not zero, can its magnitude be zero? Explain.

(vi) If all the components of the vectors, A_1 and A_2 were reversed, how would this alter $\vec{A}_1 \times \vec{A}_2$?s

(vii) Distinguish between Translational and Rotational equilibrium.

(viii) Explain the circumstances in which the velocity "v" and acceleration "a" of a car are:
(i) Parallel   (ii) Anti-parallel

(ix) At what point or points in its path does a projectile have its minimum speed, its maximum speed?

(x) What do you mean by Inertia? How it is important in Newton's first law of motion?

(xi) What does the slope of velocity-time graph show?

(xii) A person is standing near a fast moving train. Is there any danger that he will fall towards it?

3. Attempt any eight parts. 8 × 2 = 16

(i) When a rocket re-enters the atmosphere, its nose cone becomes very hot. Where does this heat energy come from?

(ii) Write the two names of conservative forces and non-conservative forces.

(iii) A boy uses a catapult to throw a stone which accidentally smashes a green house window. List the possible energy changes.

(iv) Write down the four uses of Geostationary satellites.

(v) Describe what should be the minimum velocity, for a satellite, to orbit close to the Earth around it.

(vi) On what factors the moment of inertia of a body depends? Explain.

(vii) What is a simple harmonic oscillator? Give an example.

(viii) If a mass spring system is hung vertically and set into oscillations, why does the motion eventually stop?

(ix) What is the total distance travelled by an object moving with SHM in a time equal to its period, if its amplitude is A?

(x) If the speed of sound is $332\,ms^{-1}$ in air at $0^\circ C$ then find its speed at $20^\circ C$.

(xi) Explain the terms   (i) Crest   and   (ii) Trough

(xii) Is it possible for two identical waves travelling in the same direction along a string to give rise to a stationary wave?

4. Attempt any six parts. 6 × 2 = 12

(i) Could you obtain Newton's rings with transmitted light? If yes, would the pattern be different from that obtained with reflected light?

(ii) How would you manage to get more orders of spectra using a diffraction grating?

(iii) Write two uses of Michelson's interferometer?

(iv) How the light signal is transmitted through optical fibre?

(v) Calculate the value of critical angle for glass by total internal reflection.

(vi) What happens to the temperature of the room, when an airconditioner is left running on a table in the middle of the room?

(vii) What is effect of pressure and density on speed of sound?

(viii) Does entropy of a system increase or decrease due to friction? Explain.

(ix) What will be the efficiency of an engine if it performs 100J of work and rejects 400J of heat energy to the cold reservoir?

SECTION-II

NOTE: Attempt any three questions. 3 × 8 = 24

5.(a) Explain vector product with its characteristics and examples. — 5

(b) A force (Thrust) of 400N is required to overcome road friction and air resistance in propelling an automobile at $80\,kmh^{-1}$. What power (kW) must the engine develop? — 3

6.(a) A projectile is thrown with initial velocity v_i making an angle θ with the horizontal. Find its time of flight, range and maximum range. — 5

(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? — 3

7.(a) Define and explain molar specific heats of a gas. Also, derive their relation. — 5

(b) Water flows through a hose, whose internal diameter is 1cm at a speed of $1\,ms^{-1}$. What should be the diameter of the nozzle if the water is to emerge at $21\,ms^{-1}$? — 3

8.(a) How various factors affect the speed of sound? Discuss. — 5

(b) What should be the length of simple pendulum whose period is 1.0 second at a place where $g = 9.8\,ms^{-2}$? What is the frequency of such a pendulum? — 3

9.(a) Explain construction, ray diagram and magnification of an astronomical telescope. — 5

(b) In a double slit experiment the second order maximum occurs at $\theta = 0.25^\circ$. The wavelength is 650 nm. Determine the slit separation. — 3