LHR-G2-11-18

Roll No _____ (To be filled in by the candidate) **(Academic Sessions 2015 – 2017 to 2017 – 2019)**

PHYSICS 218-(INTER PART – I) Time Allowed : 20 Minutes

Q.PAPER – I (Objective Type) GROUP – II Maximum Marks : 17

PAPER CODE = 6478

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	Intensity of light depends on :			
	(A) Wavelength	(B) Amplitude	(C) Velocity	(D) Frequency
2	The ratio of angular frequency and linear frequency is :			
	(A) 2π	(B) π	(C) $\frac{1}{2\pi}$	(D) $\frac{\pi}{2}$
3	Which shows correct relation between H and T of projectile :			
	(A) $H = \frac{gT^2}{8}$	(B) $H = \frac{8T^2}{g}$	(C) $H = \frac{8g}{T^2}$	(D) $H = \frac{8}{gT^2}$
4	Velocity of sound is independent of :			
	(A) Temperature	(B) Density	(C) Pressure	(D) Medium
5	If the radius of droplet becomes half, then its terminal velocity will be :			
	(A) Double	(B) Half	(C) One fourth	(D) Four time
6	The percentage uncertainty in measurement of mass and velocity are 2% and 3%, the maximum uncertainty in the measurement of kinetic energy is :			
	(A) 11%	(B) 8%	(C) 6%	(D) 1%
7	SI unit pressure of gas is :			
	(A) Nm^{-2}	(B) Nm	(C) N^2m^{-1}	(D) N^2m
8	Hot igneous rocks usually in molten or partly molten state are found in the depth of :			
	(A) 5 km	(B) 10 km	(C) 15 km	(D) 20 km
9	Angle between ray of light and wave front is :			
	(A) 0^o	(B) 60^o	(C) 120^o	(D) 90^o
10	Solid angle subtended at the center by a sphere is :			
	(A) 2π	(B) 4π	(C) 6π	(D) 8π
11	If 30 waves per second pass through a medium at speed of $30ms^{-1}$, the wavelength is :			
	(A) 30 m	(B) 15 m	(C) 1 m	(D) 900 m
12	$\hat{i}.(\hat{j}\times\hat{k})$ is equal to :			
	(A) $\hat{k}$	(B) 1	(C) Null vector	(D) Zero
13	Information carrying capacity of optical fibre is called :			
	(A) Capacity	(B) Band width	(C) Immunity	(D) Ability
14	Radar system is an application of :			
	(A) Interference	(B) Beats		
	(C) Stationary waves	(D) Doppler's effect		
15	For an ideal gas, the potential energy associated with its molecules is :			
	(A) Maximum	(B) Zero	(C) $\frac{1}{2}KX_o^2$	(D) $\frac{1}{2}KX_o$
16	A wheel of radius 50 cm having an angular speed 5 rad / sec will have linear speed :			
	(A) $1.5ms^{-1}$	(B) $2.5ms^{-1}$	(C) $3.5ms^{-1}$	(D) $4.5ms^{-1}$
17	The resultant of two forces 3N and 4N acting parallel to each other is :			
	(A) 7N	(B) 1N	(C) 5N	(D) 4N

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PHYSICS 218-(INTER PART – I) Time Allowed : 2.40 hours

PAPER – I (Essay Type) GROUP – II Maximum Marks : 68

SECTION – I

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2. Write short answers to any EIGHT (8) questions : 16

(i) Calculate the distance covered by the light in free space in one year.

(ii) Show that the Einstein's equation $E = mc^2$ is dimensionally correct.

(iii) What do you mean by random error and systematic error?

(iv) Add the following upto appropriate precision 3.125, 1.2, 0.038.

(v) What is the unit vector in the direction of vector $\vec{A} = 2\hat{i} - \hat{j} + 2\hat{k}$?

(vi) Can the dot product of two vectors be equal to the product of their magnitudes? Explain.

(vii) State first and second condition of equilibrium alongwith their equation.

(viii) Water flows out from a pipe at $5kgs^{-1}$ and its velocity changes from $4ms^{-1}$ to zero on striking the wall. Find the force exerted by the water on the wall.

(ix) Show that range R and maximum range R_{max} are related as $\frac{R}{R_{max}} = \sin 2\theta$

(x) Can the velocity of an object reverse the direction when acceleration is constant? If so give an example?

(xi) Define viscosity and drag force.

(xii) Explain the working of carburetor of a motorcar using Bernoulli's principle.

3. Write short answers to any EIGHT (8) questions : 16

(i) Derive work energy principle.

(ii) Explain methods of : (i) Direct combustion.
(ii) Fermentation to convert biomass into fuels.

(iii) A cup is dropped from a certain height, which breaks into pieces. What energy changes are involved?

(iv) When mud flies off the tyre of a moving bicycle, in what direction does it fly?

(v) What is difference between spin angular momentum and orbital angular momentum?

(vi) Define radian and find how many degrees are in one radian.

(vii) Does period depend on amplitude of vibrating body? Explain.

(viii) Define restoring force and what is its direction?

(ix) At which positions the velocity of a simple harmonic oscillator is maximum and minimum?

(x) How are beats useful in tuning musical instruments?

(xi) Astronomers use the Doppler effect to calculate the speed of distance stars. How?

(xii) What is the affect on phase of a wave when it is reflected from a boundary?

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4. Write short answers to any SIX (6) questions : **12**

(i) Under what conditions two or more sources of light behave as coherent sources?

(ii) Why the Polaroid sunglasses are better than ordinary sunglasses?

(iii) An oil film spreading over a wet footpath shows colours. Explain how does it happen?

(iv) One can buy a cheap microscope for the use by the children. The images seen in such a microscope have coloured edges. Why is this so?

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

(vi) Give an example of a natural process that involves an increase in entropy.

(vii) Why is the average velocity of the molecules in a gas zero but the average of the square of velocities is not zero?

(viii) Give the statement of second law of thermodynamics and Carnot's theorem.

(ix) Is it possible to convert internal energy into mechanical energy? Explain with an example.

SECTION – II

Note : Attempt any THREE questions.

5. (a) Define vector product or cross product. Explain with right hand rule and give four characteristics of cross product. 5

(b) Find angle of projection of a projectile for which its maximum height and the horizontal range are equal. 3

6. (a) What is absolute gravitational potential energy? Derive an expression for it. 5

(b) What would be the orbiting speed to launch a satellite in a circular orbit 900 km above the surface of the earth? Mass of earth = $6 \times 10^{24}\,kg$, Radius of earth = 6400 km 3

7. (a) Define and explain entropy with an example. Does entropy decrease for reversible process? Why absolute value of entropy can not be determined? 5

(b) A heat engine performs 100 J of work and at the same time rejects 400 J of heat energy to the cold reservoir. What is the efficiency of the engine? 3

8. (a) What is simple pendulum? Show that its motion is simple harmonic. Also derive an expression for its time period. 5

(b) An organ pipe has a length of 50 cm. Find the frequency of its fundamental note and the next harmonic when it is opened at both ends. Speed of sound = $350\,ms^{-1}$. 3

9. (a) Discuss in detail the Young's double slit experiment to study the interference of light. 5

(b) A glass light pipe in air will totally internally reflect a light ray if its angle of incidence is at least 39°. What is minimum angle for total internal reflection if pipe is in water (n = 1.33)? 3

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