LHR

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 – I Maximum Marks : 17

PAPER CODE = 6475

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	The component of the weight which balances the tension in pendulum is : (A) mg cos0 (B) mg sinθ (C) mg tanθ (D) – mg sinθ
2	Work has the dimensions as that of : (A) Momentum (B) Power (C) Torque (D) Force
3	If red light is used as compared to blue light, then fringe spacing : (A) Increases (B) Decreases (C) Remains same (D) Becomes zero
4	A precise measurement is the one which has : (A) Greater precision (B) Less precision (C) Medium precision (D) More % error
5	The work done in isochoric process is : (A) Constant (B) Variable (C) Zero (D) Depend on condition
6	As we go from pole to equator of earth, the value of 'g' : (A) Increases (B) Decreases (C) Remains constant (D) Zero
7	Maximum number of components of a vector may be : (A) One (B) Two (C) Three (D) Infinite
8	Physical quantity " pressure" in term of base unit is : (A) $Kg^{-1}mS^{-2}$ (B) $Kg^{2}mS^{-3}$ (C) $Kg^{2}m^{-2}Sec$ (D) $Kg\,m^{-1}S^{-2}$
9	When one end of organ pipe is closed, then the frequency of stationary waves of any harmonic in it is given by : (A) $f_n = \frac{nv}{2\ell}$ (B) $f_n = \frac{n\ell}{4v}$ (C) $f_n = \frac{4v}{n\ell}$ (D) $f_n = \frac{nv}{4\ell}$
10	Repeaters are placed in new system at distance of : (A) 30 km (B) 50 km (C) 80 km (D) 100 km
11	The fluid is said to be incompressible, if its density is : (A) Zero (B) Very high (C) Very small (D) Constant
12	The distance covered by a body in time 't' starting from rest is : (A) at^2 (B) $2at^2$ (C) $\frac{1}{2}at^2$ (D) $\frac{1}{2}a^2t$
13	When hot and cold water are mixed, the entropy : (A) Decreases (B) Increases (C) Remains constant (D) Zero
14	The relation between the speed of disc and hoop can be written as : (A) $V_{disc} = \sqrt{\frac{3}{4}}V_{hoop}$ (B) $V_{disc} = \sqrt{\frac{4}{3}}V_{hoop}$ (C) $V_{disc} = V_{hoop}$ (D) $V_{disc} = \frac{1}{2}V_{hoop}$
15	The magnitude of a vector $\vec{r} = 3\hat{i} + 6\hat{j} + 2\hat{k}$ is : (A) – 1 (B) – 7 (C) 7 (D) 8
16	If a stretched string is 4 m and it has 4 loops of stationary waves, then wavelength is : (A) 1 m (B) 2 m (C) 3 m (D) 4 m
17	The blue colour of sky is due to : (A) Diffraction of light (B) Reflection of light (C) Polarization of light (D) Scattering of light

(b) A sheet of lead 3.0mm thick [illegible]
of lead sheet which will reduce the intensity to half of its initial value.

4. **Write short answers to any SIX (6) questions :** 1½

(i) Differentiate between polarized and unpolarized light.

(ii) What aspect of nature of light is proved by the phenomena of polarization?

(iii) Explain briefly whether the Young's experiment is an experiment for studying interference or diffraction effects of light.

(iv) Differentiate between linear magnification and angular magnification.

(v) Why would it be advantageous to use blue light with a compound microscope?

(vi) Derive Charles's law from kinetic theory of gases.

(vii) Define internal energy of a substance.

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

(ix) Is it possible to construct a heat engine that will not expel heat into the atmosphere?

SECTION – II

Note : Attempt any THREE questions.

5. (a) Define elastic and inelastic collision. Discuss elastic collision in one dimension and show that velocity of approach is equal to the velocity of separation. 5

(b) A load of 10 N is suspended from a clothline. This distorts the line so that it makes an angle of 15^{o} with each end. Find tension in the clothline. 3

6. (a) What is escape velocity? Derive an expression for it and calculate its value on the surface of the earth. 5

(b) A 1000 kg car travelling with a speed of 144 kmh^{-1} round a curve of radius 100 m. Find the necessary centripetal force. 3

7. (a) What is petrol engine? Describe its working by elaborating its four strokes and what is main difference between petrol engines and diesel engines. 5

(b) 336 J of energy is required to melt 1 gm of ice at 0 °C. What is the change in entropy of 30 gm of water at 0 °C as it is changed to ice at 0 °C by a refrigerator? 3

8. (a) What is Doppler Effect? Discus the case when :
(i) observer is moving towards a stationary source,
(ii) observer is moving away from stationary source. 5

(b) A simple pendulum is 50.0 cm long. What will be its frequency of vibration at a place where $g = 9.8ms^{-2}$? 3

9. (a) Explain a simple microscope. Derive formula for its magnification. 5

(b) Sodium light of wavelength $\lambda = 589$ nm, is incident normally on a grating having 3000 lines per centimeter. What is highest order of the spectrum obtained with this grating? 3

LHR

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

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

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

SECTION – I

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

(i) Define and explain scientific notation,also give example.

(ii) Show that the expression $v_f = v_i + at$ is dimensionally correct.

(iii) Write any two uses of dimensional analysis.

(iv) Name several repetitive phenomenon occurring in nature which could serve as reasonable time standards.

(v) Can the magnitude of a vector have a negative value?

(vi) The veetor sum of three vectors gives a zero resultant. What can be the orientation of the vectors?

(vii) Define the terms (i) Null vector (ii) Subtraction of vector

(viii) What happens when a very heavy body collides with lighter stationary body? Explain.

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

(x) Define isolated system with example.

(xi) Two boats moving parallel in the same directon are pulled towards each other. Explain why?

(xii) Explain the difference between laminar flow and turbulent flow.

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

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

(ii) What sort of energy is in compressed spring and water in a high dam?

(iii) Write two merits and demerits of solar cells.

(iv) Explain how many minimum number of geo-stationary satellites are required for global coverage of T.V. transmission.

(v) Show that orbital angular momentum $L_o = mvr$

(vi) Find total kinetic energy of rolling sphere of mass 'm' and radius ' r ' on horizontal smooth surface.

(vii) Prove that $\omega = \sqrt{\frac{k}{m}}$ for mass spring system.

(viii) How displacement and amplitude are related for mass spring system?

(ix) What happens to the period of a simple pendulum if its length is doubled? What happens if the suspended mass is doubled?

(x) Explain the term crest, trough, node and antinode.

(xi) As a result of a distant explosion an observer senses a ground tremor and then hears the explosion. Explain the time difference.

(xii) Why does transverse wave reflecting from a denser medium undergo a phase change of 180°?

(Turn Over)

(b) A sheet of lead 3.0mm thick reduces
of lead sheet which will reduce the intensity to half of its initial value.

LHR

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 = 6472

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	Solid angle subtended at the center by a sphere is :			
	(A) 2π	(B) 4π	(C) 6π	(D) 8π
2	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%
3	$\hat{i}.(\hat{j}\times\hat{k})$ is equal to :			
	(A) $\hat{k}$	(B) 1	(C) Null vector	(D) Zero
4	The resultant of two forces 3N and 4N acting parallel to each other is :			
	(A) 7N	(B) 1N	(C) 5N	(D) 4N
5	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) $H=\frac{8}{gT^2}$
6	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
7	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) $4.5ms^{-1}$
8	The ratio of angular frequency and linear frequency is :			
	(A) 2π	(B) π	(C) $\frac{1}{2\pi}$	(D) $\frac{\pi}{2}$
9	If the radius of droplet becomes half, then its terminal velocity will be :			
	(A) Double	(B) Half	(C) One fourth	(D) Four time
10	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
11	Velocity of sound is independent of :			
	(A) Temperature	(B) Density	(C) Pressure	(D) Medium
12	Radar system is an application of :			
	(A) Interference	(B) Beats		
	(C) Stationary waves	(D) Doppler's effect		
13	Angle between ray of light and wave front is :			
	(A) 0^o	(B) 60^o	(C) 120^o	(D) 90^o
14	Intensity of light depends on:			
	(A) Wavelength	(B) Amplitude	(C) Velocity	(D) Frequency
15	Information carrying capacity of optical fibre is called :			
	(A) Capacity	(B) Band width	(C) Immunity	(D) Ability
16	For an ideal gas, the potential energy associated with its molecules is :			
	(A) Maximum	(B) Zero	(C) $\frac{1}{2}KX_o^2$	(D) $\frac{1}{2}KX_o$
17	SI unit pressure of gas is :			
	(A) Nm^{-2}	(B) Nm	(C) N^2m^{-1}	(D) N^2m

(b) A sheet of lead 3.0mm thick reduces ...
of lead sheet which will reduce the intensity to half of its initial value.

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

(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

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

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

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

SECTION – I

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?

(Turn Over)

(b) A sheet of lead 3.0mm thick reduces the
of lead sheet which will reduce the intensity to half of its initial value.