Roll No. : _____

| Objective Paper Code 6477 | Intermediate Part First (New Scheme) PHYSICS (Objective) GROUP - I Time: 20 Minutes   Marks: 17 | ☆ ☆ ☆ ☆ |

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 the relevant circle in front of that question number on computerized answer sheet. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero marks in that question. Attempt as many questions as given in objective type question paper and leave other circles blank.

S.#	Questions	A	B	C	D
1	Equation of continuity gives conservation of:	Energy	Power	Mass	Density
2	Orbital velocity of a satellite of mass "m_s" orbiting around earth of mass "M" is:	$\sqrt{\dfrac{GM}{r}}$	$\sqrt{\dfrac{Gm_s}{r}}$	$\dfrac{GM}{r}$	$\sqrt{gR}$
3	In rotational motion analogous of force is:	Torque	Inertia	Velocity	Momentum
4	Scalar product of force and velocity is:	Work	Power	Energy	Acceleration
5	Impulse has same unit as that of:	Force	Energy	Mass	Linear momentum
6	Cross-product of $\hat{j} \times \hat{k}$ is:	Zero	1	$\hat{i}$	$-\hat{i}$
7	Rectangular components have angle between them is:		45°	60°	90°
8	The quantity 2.3×10^{-3} can be written as:	0.0023	0.023	0.23	2.3
9	Light year is the unit of:	Light	Time	Velocity	Distance
10	An ideal heat engine can only be 100% efficient if its cold temperature is:	0K	0°C	100K	100°C
11	Average translational K.E of a gas molecule is:	$\dfrac{1}{2}kT$	kT	$\dfrac{2}{3}kT$	$\dfrac{3}{2}kT$
12	Near point for a person is at:	25cm	25mm	25nm	25dm
13	Angle between ray of light and wave front is:	Zero	60°	45°	90°
14	Speed of sound in vacuum is:	$332\dfrac{m}{s}$	$333\dfrac{m}{s}$	$280\dfrac{m}{s}$	Zero
15	If a string vibrates in " n " loops, the wavelength of stationary wave will be:	$\dfrac{2\ell}{n}$	$\dfrac{n\ell}{2}$	$\dfrac{2n}{\ell}$	$\dfrac{\ell}{2n}$
16	Product of frequency " f " and time " t " is:	1	Displacement	Velocity	Amplitude
17	Product of area of cross section, velocity and time gives:	Volume	Density	Mass	Weight

35-XI119-25000

Intermediate Part First (New Scheme)   Roll No

PHYSICS   (Subjective)   GROUP - I

Time: 02:40 Hours   Marks: 68

SECTION – I

2. **Write short answers to any EIGHT parts.**   16
   (i)   Write the dimensions of pressure and density.
   (ii) Define radian and steradian.
   (iii) Two vectors have unequal magnitudes. Can their sum be zero? Explain.
   (iv) Suppose the sides of a closed polygon represent vectors arranged head to tail. What is the sum of these vectors?
   (v)   Give two factors on which turning effect depends.
   (vi) When a rocket re-enters the atmosphere, its nose cone becomes very hot. Where does this heat energy come from?
   (vii) Define law of conservation of energy.
   (viii) Explain the difference between laminar flow and turbulent flow.
   (ix) Define venturi effect. Also write its relation.
   (x)   If a mass spring system is hung vertically and set into oscillations, why does the motion eventually stop?
   (xi) Describe some common phenomena in which resonance plays an important role.
   (xii) Define periodic motion. Give example.

3. **Write short answers to any EIGHT parts.**   16
   (i)   At what point or points in its path does a projectile have its minimum speed, its maximum speed?
   (ii) Can the velocity of object reverse the direction when acceleration is constant? If so, give an example.
   (iii) The horizontal range of projectile is four times of its maximum height. What is angle of projection?
   (iv) Define ballistic flight and ballistic trajectory.
   (v)   When mud flies off the tyre of a moving bicycle, in which direction does it fly? Explain.
   (vi) Why does a diver change his body positions before and after diving in the pool?
   (vii) Differentiate between real weight and apparent weight.
   (viii) How many radians are there in 2 degree?
   (ix) Explain the terms crest, trough node and anti-node.
   (x)   How are beats useful in tuning musical instruments?
   (xi) Why sound travel faster in hydrogen than in oxygen?
   (xii) What do you mean by sonar technique? Explain briefly.

4. **Write short answers to any SIX parts.**   12
   (i)   How would you distinguish between unpolarized light and polarized light?
   (ii) An oil film spreading over a wet footpath shows colours. Explain how does it happen?
   (iii) Under what conditions two or more sources of light behave as coherent sources?
   (iv) Why would it be advantageous to use blue light with a compound microscope?
   (v)   Differentiate between linear magnification and angular magnification.
   (vi) Why does the pressure of a gas in a car tyre increase when it is driven through some distance?
   (vii) Is it possible to convert internal energy into mechanical energy? Explain with an example
   (viii) Does the entropy of a system increase or decrease due to friction? Explain briefly.
   (ix) State first law of thermodynamics.

SECTION – II   Attempt any THREE questions. Each question carries 08 marks.

5. (a) Derive Boyle's law and Charle's law from the pressure of a gas equation.   05
   (b) Suppose, we are told that the acceleration of a particle moving in a circle of radius r with uniform velocity v is proportional to some power of r, say r^n, and some power of v, say v^m, determine the powers of r and v.   03

6. (a) Define vector product. Write any four characteristics of vector product.   05
   (b) A 100g golf ball is moving to the right with a speed of $20ms^{-1}$. It makes a head on collision with an 8kg steel ball, initially at rest. Compute velocities of the balls after collision.   03

7. (a) Discuss the inter-conversion of potential and kinetic energy in absence of air friction. Also discuss the effect of air resistance.   05
   (b) A stationary wave is established in a string which is 120cm long and fixed at both ends. The string vibrates in four segments, at a frequency of 120Hz. Determine its wavelength and the fundamental frequency.   03

8. (a) What is simple pendulum? Show that motion of simple pendulum is simple harmonic. Also derive expression for its time period.   05
   (b) A gramophone record turntable accelerates from rest to an angular velocity of 45 rev min in 1.60s. What is its average angular acceleration?

9. (a) What is simple microscope? Describe its construction, working and also derive the relation for its angular magnification.   05
   (b) A light of $\lambda = 589nm$ is incident normally on grating having 3000 lines per centimeter. What is the highest order, the spectrum obtained with this grating?   03

Roll No. : _____

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Objective
Paper Code
6472

Intermediate Part First (New Scheme)
PHYSICS (Objective) GROUP - II
Time: 20 Minutes   Marks: 17

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 the relevant circle in front of that question number on computerized answer sheet. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero marks in that question. Attempt as many questions as given in objective type question paper and leave other circles blank.

S.#	Questions	A	B	C	D
1	Dimensions of power are:	$[ML^2T^{-3}]$	$[M^2LT^{-2}]$	$[MLT^{-1}]$	$[MLT^{-2}]$
2	If error in measurement of radius of circle is 2%, then permissible error in its area will be:	1%	2%	4%	8%
3	Three vectors $\vec{A}$, $\vec{B}$ and $\vec{C}$ satisfy the relation $\vec{A} \cdot \vec{B} = 0$ and $\vec{A} \cdot \vec{C} = 0$, the vector $\vec{A}$ is parallel to:	$\vec{B}$	$\vec{C}$	$\vec{B} \cdot \vec{C}$	$\vec{B} \times \vec{C}$
4	Angle between the vectors $(\hat{i} + \hat{j})$ and $(\hat{j} + \hat{k})$ is:	$0°$	$60°$	$90°$	$180°$
5	If the momentum of a body is numerically equal to its kinetic energy, then speed of body is:	$1ms^{-1}$	$2ms^{-1}$	$4ms^{-1}$	$8ms^{-1}$
6	Area under force-displacement graph gives:	Velocity	Power	Work done	Acceleration
7	In rotational motion, analogous of mass is:	Momentum	Inertia	Moment of inertia	Angular momentum
8	A body is moving in a circular path. The angle between its linear velocity and angular velocity is:	$180°$	$90°$	$45°$	$0°$
9	The velocity of rain drop attains constant value due to:	Air currents	Upthrust of air	Surface tension	Viscous force exerted by air
10	Speed of efflux is measured by the relation:	$v = \sqrt{gh}$	$v = \sqrt{\dfrac{gh}{2}}$	$v = \sqrt{2gh}$	$\sqrt{\dfrac{4}{3}gh}$
11	In mass spring system, $\frac{1}{2}kx_o^2$ represents:	Total energy	K.E	P.E	Velocity
12	Speed of sound in vacuum at a temperature of 0°C is:	$332ms^{-1}$	$340ms^{-1}$	$333ms^{-1}$	Zero
13	The frequency of sound in a medium is " f " and velocity " v ", if frequency in same medium becomes " 4f " then velocity will be:	*BLANK*	$2v$	$3v$	$4v$
14	In Young's double slit experiment, the fringe spacing is equal to:	$\dfrac{d}{\lambda L}$		$\dfrac{\lambda L}{d}$	$\dfrac{\lambda d}{L}$
15	Nature of image in compound microscope is:	Real and inverted	Real and erect	Virtual and inverted	Virtual and erect
16	When all systems are taken together as the universe, the entropy of universe always:	Decrease	Increase	Remains unchanged	Nothing can be decided
17	The efficiency of diesel engine is about:	10% to 20%	15% to 25%	25% to 35%	35% to 40%

36-XI119-24000

PHYSICS   (Subjective)   GROUP - II

Time: 02:40 Hours   Marks: 68

SECTION – I

2. **Write short answers to any EIGHT parts.** 16
   (i)   Write the dimensions of pressure and density.
   (ii)   Differentiate between precise and accurate measurement.
   (iii) Can the magnitude of a vector have negative value? Explain.
   (iv)   Can you add zero to a null vector? Explain.
   (v)   Determine the direction of $\vec{A} = -3\hat{i} - 8\hat{j}$ with positive x-axis.
   (vi)   An object has one joule of potential energy. Explain what does it mean?
   (vii) What do you mean by aquifer?
   (viii) Explain the difference between laminar flow and turbulent flow.
   (ix)   How an aeroplane is lifted upward?
   (x)   Can we realize an ideal simple pendulum? Explain.
   (xi)   Does frequency depend on amplitude for harmonic oscillators?
   (xii) A spring of spring constant 'k' is cut into two equal lengths then what will be the spring constant for each part? Explain.

3. **Write short answers to any EIGHT parts.** 16
   (i)   Show that impulse and momentum have same units.
   (ii)   An object is thrown vertically upward. Discuss the sign of acceleration due to gravity, relative to velocity while object is in air.
   (iii) Explain the conditions in which velocity v and acceleration a of a car are perpendicular to each other.
   (iv)   Define ballistic missile and ballistic trajectory.
   (v)   Show that 1 rad = 57.3°
   (vi)   What is meant by moment of inertia? Explain its significance.
   (vii) Describe what should be the minimum velocity for a satellite to orbit close to the earth around it.
   (viii) How artificial gravity is produced in the artificial satellite? Explain.
   (ix)   How are beats useful in tuning a musical instrument? Explain.
   (x)   Why sound travels faster in solids than in gasses?
   (xi)   Define electromagnetic waves. Give example.
   (xii) Is it possible for two identical waves travelling in same direction along a string to give rise to stationary waves? Explain.

4. **Write short answers to any SIX parts.** 12
   (i)   Give the two parts of Huygen's principle.
   (ii)   Under what conditions two or more sources of light behave as coherent sources?
   (iii) How would you distinguish between un-polarized and plane-polarized lights?
   (iv)   What is resolving power of an optical instrument? Give its formula.
   (v)   Why would it be advantageous to use blue light with a compound microscope?
   (vi)   Derive Charles' law from the kinetic molecular theory of gasses.
   (vii) Why does the pressure of a gas in a car tyre increase when it is driven through some distance?
   (viii) Can the mechanical energy be converted completely into heat energy? If so give an example.
   (ix)   Does entropy of a system increase or decrease due to friction? Briefly explain using formula for change in entropy.

SECTION – II   Attempt any THREE questions. Each question carries 08 marks.

5. (a) What is meant by dimensions of physical quantities? How can you derive formula for the time period of simple pendulum using dimensional analysis? 05
   (b) Estimate the average speed of nitrogen molecules in air under standard conditions of pressure and temperature. 03

6. (a) State and prove law of conservation of momentum. 05
   (b) Two particles are located at $\vec{r}_1 = 3\hat{i} - 7\hat{j}$ and $\vec{r}_2 = -2\hat{i} + 3\hat{j}$ respectively. Find both the magnitude of the vector $(\vec{r}_2 - \vec{r}_1)$ and its orientation with respect to the x-axis. 03

7. (a) What are stationary waves? Discuss the stationary waves in air column with (i) both ends open (ii) one end open. 01.04
   (b) How large a force is required to accelerate an electron ($m = 9.1 \times 10^{-31}$ kg) from rest to a speed of 2.0×10^7 ms^{-1} through a distance of 5.0 cm? 03

8. (a) Derive a relation for the frequency of a rotating spaceship to achieve the artificial gravity equal to earth's gravity. 05
   (b) A block of mass 4 kg is dropped from a height ... 8.0 m on to a spring of spring constant k = ... N m. Find the maximum distance through which the spring will be compressed. 03

9. (a) What is diffraction grating? Derive grating equation for finding the wavelength of light used. 05
   (b) An astronomical telescope having magnifying power of 5 consists of two thin lenses 24 cm apart. Find the focal lengths of the lenses. 03

36-XII19-24000

Roll No _____ — (To be filled in by the candidate) (Academic Sessions 2015 – 2017 to 2018 – 2020)

PHYSICS 219-(INTER PART – I) Time Allowed : 20 Minutes
Q.PAPER – I (Objective Type) GROUP – I Maximum Marks : 17

PAPER CODE = 6471

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 ratio of 1 femtometer to 1 nanometer is :
	(A) 10^{-6} (B) 10^{6} (C) 10^{-7} (D) 10^{8}
2	In the relation $F = 6\pi\eta\,r\,v$. Dimensions of coefficient of viscosity η is :
	(A) $[M^{-1}LT^{-1}]$ (B) $[ML^{-1}T]$ (C) $[M^{-1}L^{-1}T]$ (D) $[ML^{-1}T^{-1}]$
3	If $\vec{F} = (2\hat{i} + 4\hat{j})N$; $\vec{d} = (5\hat{i} + 2\hat{j})m$ work done is :
	(A) 15 J (B) 18 J (C) Zero (D) – 18 J
4	The sum of two perpendicular forces 8 N and 6 N is :
	(A) 2 N (B) 14 N (C) 10 N (D) – 2 N
5	The distance covered by a freely falling body in first 2 seconds, when its initial velocity was zero :
	(A) 9.8 m (B) 39.2 m (C) 19.6 m (D) 4.9 m
6	Value of solar constant is :
	(A) $1.4\,Wm^{-2}$ (B) $1400\,Wm^{-2}$ (C) $14\,kWm^{-2}$ (D) $1.0\,kWm^{-2}$
7	Relation between the speed of disc and hoop at the bottom of an incline is :
	(A) $V_{disc} = \sqrt{\dfrac{3}{4}}\,V_{hoop}$ (B) $V_{disc} = \sqrt{\dfrac{4}{3}}\,V_{hoop}$ (C) $V_{disc} = \sqrt{\dfrac{2}{5}}\,V_{hoop}$ (D) $V_{disc} = 2V_{hoop}$
8	2 revolutions are equal to :
	(A) π rad (B) $\dfrac{3\pi}{2}$ rad (C) 2π rad (D) 4π rad
9	Terminal velocity V_t is related with the radius r of a spherical object as :
	(A) $v_t \propto r^2$ (B) $v_t \propto r$ (C) $v_t \propto \dfrac{1}{r}$ (D) $v_t \propto \dfrac{1}{r^2}$
10	The unit of $\dfrac{1}{2}\rho V^2$ in Bernoulli's equation is same as that of :
	(A) Energy (B) Pressure (C) Work (D) Power
11	Base units of spring constant is :
	(A) $kg^{-1}s^{-2}$ (B) $kg^{-1}ms^{-2}$ (C) $kg\,ms^{-2}$ (D) kgs^{-2}
12	Speed of sound at 0 °C, in air is :
	(A) $332\,ms^{-1}$ (B) $280\,ms^{-1}$ (C) $1400\,ms^{-1}$ (D) $5500\,ms^{-1}$
13	Two identical waves moving in same direction produce :
	(A) Interference (B) Beats (C) Stationary waves (D) Diffraction
14	Bragg's equation is :
	(A) $2d\sin\theta = n\dfrac{\lambda}{2}$ (B) $d\sin\theta = n\lambda$ (C) $d\sin\theta = n\dfrac{\lambda}{2}$ (D) $d\sin\theta = 2\lambda$
15	If $f_o = 100\,cm$; $f_e = 5\,cm$ length and magnifying power of an astronomical telescope is :
	(A) 0.05 cm ; 20 (B) 95 cm ; 20 (C) 20 cm ; 500 (D) 105 cm ; 20
16	Root mean square velocity is related to the absolute temperature of an ideal gas as :
	(A) $V_{rms} \propto T$ (B) $V_{rms} \propto T^2$ (C) $V_{rms} \propto \sqrt{T}$ (D) $V_{rms} \propto \dfrac{1}{\sqrt{T}}$
17	If P = Pressure ; V = Volume of a gas PΔV represents :
	(A) Work (B) Density (C) Power (D) Temperature

Roll No _____ (To be filled in by the candidate) (Academic Sessions 2015 – 2017 to 2018 – 2020)

PHYSICS   219-(INTER PART – I)   Time Allowed : 2.40 hours
PAPER – I (Essay Type)   GROUP – I   Maximum Marks : 68

SECTION – I   16

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

(i)   Write down the two uses of dimensional analysis.

(ii) What are the characteristics of an ideal standard?

(iii) If $\vec{A} = 4\hat{i} - 4\hat{j}$, what is the orientation of $\vec{A}$?

(iv) Define resultant vector and component of a vector.

(v)   The magnitude of the sum of two vectors is zero. What are the conditions to get this?

(vi) A car is moving along a circle of radius r. It completes/ four revolutions and terminates its journey at starting point. How much work is done by the car? Explain.

(vii) How energy is obtained by water waves and what is the source of this energy?

(viii) Explain the term systolic and diastolic pressure.

(ix) Two row boats moving parallel in the water are pulled towards each other. Explain why?

(x)   Is any relation/ existed between damping and resonance? Explain.

(xi) In relation to SHM, explain the equation $y = A \sin(\omega t + \phi)$.

(xii) A mass-spring system is vibrating with amplitude 10 cm. Find its K.E. and P.E at equilibrium position, when spring constant is $20\, Nm^{-1}$.

16

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

(i)   What is the difference between uniform velocity and uniform acceleration?

(ii) Show that time rate of change of momentum of a body equals the applied force.

(iii) A 1500 kg car has its velocity reduced from $20\, ms^{-1}$ to $15 ms^{-1}$ in 3.0 seconds. How large was the average retarding force?

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

(v)   Write down the uses of telecommunication satellites.

(vi) Show that S = rθ where S = Arc length , r = radius of the circle , θ = angle in radian.

(vii) What do you mean INTELSAT VI? What are the frequencies on which it operates?

(viii) A disc without slipping rolls down a hill of height 10.0 m. If the disc starts from rest at the top of the hill, what is the speed at the bottom?

(ix) How the speed of sound change with the density of the medium?

(x)   A pipe has a length of 1 m. Determine the frequencies of the fundamental, if the pipe is open at both ends. Speed of sound = $340\, ms^{-1}$

(xi) State Doppler Effect. Write down its one application.

(xii) How Doppler effect can be used to monitor blood flow?

(Turn Over)

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

(i) What is Bragg's law? Derive Bragg's equation.

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

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

(iv) Write two differences between angular magnification and resolving power.

(v) How a single bi-convex lens can be used as a magnifying glass?

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

(vii) Justify! Work and heat are similar.

(viii) Show that : Change in entropy is always positive.

(ix) What happens to the temperature of the room when an air-conditioner is left running on a table in the middle of the room?

SECTION – II

Note : Attempt any THREE questions.

5. (a) Prove that molar specific heat of a gas at constant pressure C_p is greater than molar specific heat at constant volume C_v by an amount equal to universal gas constant R.   5

   (b) Suppose, we are told that the acceleration of a particle moving in a circle of radius r with uniform speed v is proportional to some power of r, say r^n, and some power of v, say v^m. determine the powers of r and v.   3

6. (a) Explain the method of vector addition by rectangular components.   5

   (b) A foot ball is thrown upward with an angle of $30°$ with respect to the horizontal. To throw a 40 m pass what must be the initial speed of the ball?   3

7. (a) Define absolute potential energy. Derive relation for absolute P.E. of a body of mass m.   5

   (b) A stationary wave is established in a string which is 120 cm long and fixed at both ends. The string vibrates in four segments, at a frequency of 120 Hz. Determine its wavelength and the fundamental frequency.   3

8. (a) Define SHM. Prove that total energy remains conserved in mass-spring system, oscillating with SHM.   5

   (b) A gramophone record turntable accelerate from rest to an angular velocity of 45.0 rev min^{-1} in 1.60 s. What is its average angular acceleration?   3

9. (a) What is compound microscope? Describe its construction and working also calculate its magnification.   5

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

41-219-I-(Essay Type) - 64000

Roll No _____ (To be filled in by the candidate) (Academic Sessions 2015 – 2017 to 2018 – 2020)

PHYSICS — 219-(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	Fringe spacing increases if we use :
	(A) Red light (B) Blue light (C) Yellow light (D) Green light
2	The expression for centripetal force is given by :
	(A) $\dfrac{mv^2}{r^2}$ (B) $\dfrac{m^2v^2}{r}$ (C) $\dfrac{m^2v^2}{r^2}$ (D) $mr\omega^2$
3	Rocket ejects the burnt gasses at a speed of over (consuming fuel at rate of 10000 kg / s) :
	(A) 4000 m/s (B) 400 m/s (C) 4000 cm/s (D) 400 cm/s
4	Distance between adjacent node and antinode is :
	(A) λ (B) $\dfrac{\lambda}{2}$ (C) $\dfrac{\lambda}{4}$ (D) $\dfrac{\lambda}{3}$
5	Equation of continuity gives the conservation of the :
	(A) Mass (B) Energy (C) Speed (D) Volume
6	Which pair has same unit :
	(A) Work and power (B) Momentum and impulse
	(C) Force and torque (D) Torque and power
7	Efficiency of diesel engine is :
	(A) 25% to 30% (B) 30% to 35% (C) 35% to 40% (D) 40% to 50%
8	The ratio between orbital velocity and escape velocity is :
	(A) 1 (B) $\dfrac{1}{2}$ (C) $\sqrt{\dfrac{1}{2}}$ (D) $\sqrt{2}$
9	Types of wave used in sonar are :
	(A) Sound waves (B) Light waves (C) Heat waves (D) Water waves
10	The quantity $1\,(km)^2$ is equal to :
	(A) $1\times10^6\,m^2$ (B) $1\times10^5\,m^2$ (C) $1\times10^7\,m^2$ (D) $1\times10^4\,m^2$
11	1 torr is equal to :
	(A) $133.3\,Nm^{-2}$ (B) $133.3\,Nm^2$ (C) $133.3\,Nm$ (D) $133.3\,N^2m$
12	If R_x and R_y both are negative then resultant lies in the quadrant :
	(A) 1st (B) 2nd (C) 3rd (D) 4th
13	Product of number of rulings " N" and the order of diffraction "m" is equal to :
	(A) Resolving power (B) Magnification (C) Near point (D) Magnifying power
14	In order to double period of a simple pendulum the length of the pendulum should be increased by :
	(A) Four times (B) Three times (C) Two times (D) Eight times
15	Difference between C_p and C_v is equal to :
	(A) Avogadro's number (B) Planck's constant
	(C) Universal gas constant (D) Boltzman's constant
16	Ratio of disk velocity to hoop velocity (in case of rotational kinetic energy) is :
	(A) $\sqrt{\dfrac{4}{3}}$ (B) $\dfrac{1}{2}$ (C) 2 (D) $\sqrt{\dfrac{3}{4}}$
17	Cross product of $\hat{j}\times\hat{k}$ is :
	(A) Zero (B) 1 (C) $\hat{i}$ (D) $-\hat{i}$

Roll No _____ (To be filled in by the candidate) (Academic Sessions 2015 – 2017 to 2018 – 2020)

PHYSICS 219-(INTER PART – I) Time Allowed : 2.40 hours

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

SECTION – I

16

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

(i) Define light year. Calculate its value. (Speed of light $C = 3 \times 10^8 \, ms^{-1}$)

(ii) Give the definition of unit of solid angle.

(iii) How a vector is subtracted from another vector? Explain using diagram.

(iv) Find unit vector in the direction of the vector $\vec{A} = 12\hat{i} - 5\hat{j}$

(v) Name three different conditions that could make $\vec{A_1} \times \vec{A_2} = \vec{0}$

(vi) Calculate the work done in kilo joules in lifting a mass of 10 kg (at steady velocity) through a vertical height of 10 m.

(vii) Prove that 1 kWh = 3.6 MJ

(viii) How does a chimney work?

(ix) Explain, how the swing is produced in a fast moving cricket ball?

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

(xi) Does frequency depend on amplitude for harmonic oscillator?

(xii) Define angular frequency. Give its formula and unit.

16

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

(i) A rubber ball and lead ball of same size, are moving with same velocity. Which ball have greater momentum and why?

(ii) A bullet is fired from a rifle. Derive the relation for velocity of rifle.

(iii) Define range of projectile. In which situations its value is maximum and minimum.

(iv) Define impulse of the force and how can it relate with momentum.

(v) Define radian and degree and what is relation between them.

(vi) Define critical velocity and find its value.

(vii) What is difference between Newton's and Einstein's views of gravitation?

(viii) Define geo-synchronous satellite and what is the height of such satellite above the earth?

(ix) What are the conditions for interference of two sound waves?

(x) What is effect of temperature on speed of sound?

(xi) What is effect on frequency of sound waves, when source and observer are moving towards each other?

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

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

(i) 5000 lines per centimeter has been ruled on a diffraction grating. Find its grating element.

(ii) What is optically active crystals?

(iii) State Huygen's principle.

(Turn Over)

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

   (i) What is Bragg's law? Derive Bragg's equation.

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

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

   (iv) Write two differences between angular magnification and resolving power.

   (v) How a single bi-convex lens can be used as a magnifying glass?

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

   (vii) Justify! Work and heat are similar.

   (viii) Show that : Change in entropy is always positive.

   (ix) What happens to the temperature of the room when an air-conditioner is left running on a table in the middle of the room?

SECTION – II

Note :   Attempt any THREE questions.

5. (a) Prove that molar specific heat of a gas at constant pressure C_p is greater than molar specific heat at constant volume C_v by an amount equal to universal gas constant R.   5

   (b) Suppose, we are told that the acceleration of a particle moving in a circle of radius r with uniform speed v is proportional to some power of r, say r^n, and some power of v, say v^m, determine the powers of r and v.   3

6. (a) Explain the method of vector addition by rectangular components.   5

   (b) A foot ball is thrown upward with an angle of $30°$ with respect to the horizontal. To throw a 40 m pass what must be the initial speed of the ball?   3

7. (a) Define absolute potential energy. Derive relation for absolute P.E. of a body of mass m.   5

   (b) A stationary wave is established in a string which is 120 cm long and fixed at both ends. The string vibrates in four segments, at a frequency of 120 Hz. Determine its wavelength and the fundamental frequency.   3

8. (a) Define SHM. Prove that total energy remains conserved in mass-spring system, oscillating with SHM.   5

   (b) A gramophone record turntable accelerate from rest to an angular velocity of $45.0 \text{ rev min}^{-1}$ in 1.60 s. What is its average angular acceleration?   3

9. (a) What is compound microscope? Describe its construction and working also calculate its magnification.   5

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