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( Inter Part – I) (Session 2017-19 to 2020-22) Sig. of Student -----

Physics (Objective)

( Group I) **54291-21**

Paper (I)

Time Allowed:- 20 minutes

**PAPER CODE 2471**

Maximum Marks:- 17

Note:- You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE**, which is printed on this question paper, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

- 1) Dimension of Moment arm is  
(A) [M] (B) [T] (C) [MT] (D) [L]
- 2) Measurement taken by vernier calliper with least count 0.01 cm is recorded as 0.45 cm.  
Its percentage uncertainty is  
(A) 0.45 % (B) 0.1 % (C) 0.2 % (D) 2 %
- 3) If  $\vec{A} \times \vec{B}$  points along +ve z-axis, then vector  $\vec{A}$  and  $\vec{B}$  must lie,  
(A) yz- plane (B) xz-plane (C) xy-plane (D) zz-plane
- 4) In unit vectors  $(\hat{i} \times \hat{j}) \times \hat{k}$  is equal to  
(A) Null vector (B)  $\hat{i}$  (C)  $\hat{j}$  (D) 1
- 5) If the angle of projection is greater than  $45^\circ$ , then the  
(A) Height attained is more but range is less (B) Height attained is less but range is more (C) Range and height attained is less (D) Both height attained and range are more
- 6) A ball is thrown with an initial speed of  $30 \text{ ms}^{-1}$  in a direction  $30^\circ$  above the Horizontal.  
Its vertical component velocity is  
(A)  $25.98 \text{ ms}^{-1}$  (B)  $30 \text{ ms}^{-1}$  (C)  $10 \text{ ms}^{-1}$  (D)  $15 \text{ ms}^{-1}$
- 7) In work-Energy principle work done on a body is equal to  
(A) Kinetic energy (B) Potential energy (C) Change in Kinetic energy (D) Change in Energy
- 8) A body of mass 10 kg in free falling lift has weight  
(A) 10 N (B) 98 N (C) zero N (D) 980 N
- 9) In one Revolution, the angular displacement covered is  
(A)  $60^\circ$  (B)  $360^\circ$  (C)  $90^\circ$  (D)  $180^\circ$
- 10) Stoke's Law holds for bodies when they have  
(A) Spherical shape (B) Curved shape (C) Rectangular shape (D) Oblong shape
- 11) A simple pendulum is completing 20 vibration in 5 second; its frequency is  
(A) 4 Hz (B) 20 Hz (C) 200 Hz (D) 100 Hz
- 12) The product of frequency and time period is  
(A) 2 (B) 3 (C) 1 (D) 4
- 13) On loading the prong of a tuning fork with wax, its frequency,  
(A) Decreases (B) Increases (C) May increase or decrease (D) Remaining constant
- 14) A Diffraction grating has 3000 lines per centimeter, its grating element is  
(A)  $3.33 \times 10^{-4} \text{ cm}$  (B)  $3.33 \text{ m}$  (C)  $333 \times 10^{-4} \text{ cm}$  (D)  $3.33 \text{ cm}$
- 15) A Telescope with objective of focal length 40 cm and eyepiece of focal length 5 cm, when focused for infinity has length equal to  
(A) 35 cm (B) 8 cm (C) 45 cm (D) 200 cm
- 16) The sum of all Energies of molecules is known as  
(A) Elastic potential energy (B) Kinetic energy (C) Internal energy (D) Potential energy
- 17) If the Temperature of the source increases, the Efficiency of a carnot engine,  
(A) Decreases (B) Increases (C) Remains constant (D) First increases then decreases

1187- 1121 ALP -- 24000 (1)

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Physics (Subjective) Group (I) (Session 2017-19 to 2020-22) (Inter Part - I) Paper (I)

Time Allowed: 2.40 hours Section ----- I

Maximum Marks: 68

2. Answer briefly any Eight parts from the followings:-  $8 \times 2 = 16$

- (i) Write dimensions of (a) Pressure (b) Density **540-41-21**
- (ii) Does a dimensional analysis give any information on constant of proportionality that may appear in an algebraic expression. Explain.
- (iii) What do you mean by precision and accuracy. (iv) What do you mean by dimension of a physical quantity.
- (v) The vector sum of three vectors gives zero resultant. What can be orientation of vectors.
- (vi) Can you add zero to a null vector. (vii) Define Scalar product of two vectors.
- (viii) Define impulse and show how it is related to linear momentum.
- (ix) At what point or points in its path does a projectile have its minimum speed, its maximum speed.
- (x) Define time of flight of a projectile, give its units. (xi) Define two Dimensional motion.
- (xii) Explain how Swing is produced in a fast moving cricket ball.

3. Answer briefly any Eight parts from the followings:-  $8 \times 2 = 16$

- (i) In which case is more work done when a 50 kg bag of books is lifted through 50 cm, or when a 50 kg crate is pushed through 2m across the floor with a force of 50 N.
- (ii) Define escape velocity and calculate its value.
- (iii) Explain the situations in which the work is positive, negative or zero.
- (iv) Show that orbital angular momentum  $L_o = mvr$
- (v) State the law of conservation of angular momentum. Explain its importance.
- (vi) A hoop starts rolling without slipping down from the top of an inclined plane. What is its speed at the bottom.
- (vii) Does the acceleration of a simple harmonic oscillator remain constant during its motion? Is the acceleration ever zero? Explain.
- (viii) If a mass spring system is hung vertically and set into oscillations, why does the motion eventually stop?
- (ix) Define free and forced oscillations. (x) How are beats useful in tuning musical instruments?
- (xi) On what factors does the speed of sound in a medium depend?
- (xii) What is the frequency and the wavelength of third harmonic in a closed organ pipe?

4. Answer briefly any Six parts from the followings:-  $6 \times 2 = 12$

- (i) State Huygen's principle. (ii) Can visible light produce interference fringes? Explain.
- (iii) Define magnifying power and resolving power of lens.
- (iv) Write the conditions for Interference. (v) What is meant by normal adjustment of telescope.
- (vi) Prove the relation  $W = P\Delta V$
- (vii) Starting from the relation of pressure of a gas prove that absolute temperature of an ideal gas is directly proportional to the average translational K.E of gas molecules.
- (viii) Is it possible to construct a heat engine that will not expel heat into the atmosphere.
- (ix) Derive Boyles law on basis of Kinetic molecular theory of gases.

Note: Attempt any three questions. Section ----- II  $(8 \times 3 = 24)$

5. (a) Explain the addition of vectors by rectangular components method.
- (b) A ball is thrown horizontally from a height of 10 m with velocity of  $21 \text{ ms}^{-1}$ . How far off it hit the ground and what velocity?
6. (a) Define gravitational potential energy. Derive an expression for the absolute potential energy on the surface of the earth.
- (b) An organ pipe has a length of 50 cm. Find the frequency of its fundamental note and the next harmonic, when it is closed at one end. Speed of sound = 50 m/s.
7. (a) Define rotational K.E. Also derive the relations for the velocities of disc and hoop moving down an inclined plane to the bottom.
- (b) How large must a heating duct be if air moving  $3 \text{ ms}^{-1}$  along it can replenish the air in a room of  $300 \text{ m}^3$  volume every 15 min? Assume the air's density remains constant.
8. (a) What is simple pendulum? Show that the motion of simple pendulum is simple harmonic motion. Also find relation for its time period and frequency.
- (b) Estimate the average speed of nitrogen molecules in air under standard conditions of pressure and temperature.
9. (a) What is compound microscope? Describe its working. Also find relation for its magnifying power.
- (b) A light is incident normally on a grating which has 2500 lines per centimeter. Compute the wavelength of a spectral line for which the deviation in second order is  $15^\circ$ .

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( Inter Part – I) (Session 2017-19 to 2020-22) Sig. of Student -----

Physics (Objective)

( Group II ) 40-42-21

Paper (I)

Time Allowed:- 20 minutes

**PAPER CODE 2472**

Maximum Marks:- 17

**Note:-** You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE**, which is printed on this question paper, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

**Q. 1**

- 1) For total assessment of uncertainty in the Final result obtained by multiplication, we added  
(A) Absolute uncertainties (B) Fractional uncertainties (C) Percentage uncertainties (D) Errors
- 2) Which of the following pair has same dimension  
(A) Work and Power (B) Work and Torque (C) Momentum and Energy (D) Power and Pressure
- 3) The self dot product of vector  $\vec{A}$  is  
(A) 0 (B)  $2A$  (C)  $A$  (D)  $A^2$
- 4) If a Force of 5N is applied parallel to moment arm of 5m, then Torque is equal to  
(A) Zero Nm (B) 5 Nm (C) 10 Nm (D) 25 Nm
- 5) The force due to water Flow is  
(A)  $F = mv$  (B)  $F = \frac{ma}{t}$  (C)  $F = \frac{mv}{t}$  (D)  $F = \frac{mt}{v}$
- 6) For a rocket, the change in momentum per second of ejecting gases is equal to  
(A) Acceleration of the rocket (B) Thrust acting on rocket (C) Velocity of the rocket (D) Momentum of the rocket
- 7) The escape velocity is maximum for  
(A) Moon (B) Mercury (C) Earth (D) Jupiter
- 8) Rotational K.E of disc is  
(A)  $\frac{1}{4}mv^2$  (B)  $\frac{1}{2}mv^2$  (C)  $\frac{1}{2}mr^2$  (D)  $\frac{1}{4}mr^2$
- 9) Choose the quantity which play the same role in angular motion as mass in linear motion.  
(A) Angular Acceleration (B) Torque (C) Moment of Inertia (D) Angular Momentum
- 10) The device used to measure speed of liquid Flow is  
(A) Monometer (B) Venturi-meter (C) Hydro meter (D) Baro meter
- 11) Potential energy of oscillating mass spring system at any instant is  
(A)  $\frac{1}{2}Kx_0^2$  (B)  $Kx^2$  (C)  $mgh$  (D)  $\frac{1}{2}Kx^2$
- 12) Speed of sound in Aluminium at 20 °C is  
(A) 5100  $ms^{-1}$  (B) 3600  $ms^{-1}$  (C) 5130  $ms^{-1}$  (D) 5500  $ms^{-1}$
- 13) Beats detectable easily upto Frequency between two sounds is  
(A) 32 Hz (B) 2 Hz (C) 10 Hz (D) 6 Hz
- 14) The centre of Newton's rings is dark due to  
(A) Diffraction (B) Destructive Interference (C) Constructive Interference (D) Polarization
- 15) The Final Image formed by simple microscope is  
(A) Real and erect (B) Virtual and Inverted (C) Real and Inverted (D) Virtual and erect
- 16) For an Ideal gas, the internal energy is directly proportional to  
(A) Temperature (B) Pressure (C) Volume (D) Mass
- 17) Cloud formation in atmosphere is an example of  
(A) Isobaric process (B) Isochoric process (C) Adiabatic process (D) Isothermal process

1189- 1121 ALP -- 15000 (1)

2. Answer briefly any Eight parts from the followings:- **40-42-21**  $8 \times 2 = 16$

- (i) What are the uses of dimensions? (ii) Distinguish between precision and Accuracy.
- (iii) What are the dimensions of gravitational constant  $G$  in formula  $F = G \frac{m_1 m_2}{r_2}$
- (iv) Does a dimensional analysis give any information on constant of proportionality that may appear in algebraic expression? Explain. (v) Define terms (a) unit vector (b) Position vector
- (vi) The vector sum of three vectors gives a zero resultant. What can be the orientation of the vectors?
- (vii) Can you add zero to a null vector? (viii) Define impulse and show that how it related to linear momentum?
- (ix) Define terms (a) projectile motion (b) Height of the projectile.
- (x) In case of elastic and inelastic collision explain how would a bouncing ball behave?
- (xi) For what value of the angle of projection, the range of projectile is half of its maximum possible value?
- (xii) Explain what do you understand by the term viscosity.

3. Answer briefly any Eight parts from the followings:-

$8 \times 2 = 16$

- (i) A force of 400 N is required to overcome road friction and air resistance in propelling an automobile at  $22.22 \text{ ms}^{-1}$ . What power (KW) must the engine develop?
- (ii) A girl drop a cup from a certain height, which breaks into pieces. What energy changes are involved?
- (iii) Give two names of conservative forces and two names of non-conservative forces.
- (iv) A 1000 kg car travelling with a speed of  $40 \text{ ms}^{-1}$  round a curve of radius 100 m. Find the necessary centripetal force.
- (v) Explain the difference between tangential velocity and angular velocity.
- (vi) Why does a diver change his body positions before and after diving in the pool?
- (vii) What happens to the period of a simple pendulum if its length is doubled? What happens if the suspended mass is doubled?
- (viii) Does the acceleration of a simple harmonic oscillator remain constant during its motion? Is the acceleration ever zero? Explain.
- (ix) What is simple pendulum? Write down its formula for time period.
- (x) Explain why sound travels faster in warm air than in cold air.
- (xi) Find the frequencies produce in organ pipe when it is closed at one end.
- (xii) Define transverse and longitudinal waves.

4. Answer briefly any Six parts from the following:-

$6 \times 2 = 12$

- (i) Under what conditions two or more sources of light behave as coherent sources?
- (ii) How would you manage to get more orders of diffraction using a diffraction grating?
- (iii) What is Huygen's principle? Explain.
- (iv) What do you mean by normal adjustment of an astronomical telescope?
- (v) What is spectrometer? Write down some of its uses.
- (vi) Why is the average velocity of the molecules in a gas zero but the average of the square of velocities is not zero?
- (vii) Specific heat of a gas at constant pressure is greater than specific heat at constant volume. Why?
- (viii) Derive Charles' Law from Kinetic theory of gases. (ix) Prove that  $W = P\Delta V$

Note: Attempt any three questions.

Section ----- II

$(8 \times 3 = 24)$

5. (a) Define elastic collision. Show that for an elastic collision in one dimension speed of approach is equal to speed of separation.
- (b) Given that  $\vec{A} = 2\hat{i} + 3\hat{j}$   $\vec{B} = 3\hat{i} - 4\hat{j}$  Find the magnitude and angle of  $\vec{C} = \vec{A} + \vec{B}$
6. (a) Prove that the P.E. of a body on the surface of Earth is  $U_g = \frac{-GMm}{R}$
- (b) Find the temperature at which the velocity of sound in air is two times its velocity at  $10^\circ \text{C}$ .
7. (a) Derive the relation for centripetal force.
- (b) A water hose with an internal diameter of 20 mm at the outlet discharges 30 kg of water in 60 s. Calculate the water speed at the outlet. Assume that the density of water is  $1000 \text{ kgm}^{-3}$  and its flow is steady.
8. (a) State first law of Thermodynamics. Explain adiabatic and Iso Thermal Processes.
- (b) A simple pendulum is 50.0 cm long. What will be it's frequency of vibration at the place where  $g = 9.8 \text{ ms}^{-2}$ .
9. (a) Define interference of light wave. Derive relation for positions of mth order maxima and minima in young's Double-slit experiment.
- (b) An astronomical telescope having magnifying power of 5 consists of two thin lenses 24 cm apart. Find the focal lengths of the lenses.