Warning:- Please write your Roll No. in the space provided and sign. Roll No ....

(Inter Part – I)   (Session 2020-22 to 2023-25)   Sig. of Student ....

Physics (Objective)   (Group I)   Paper (1)

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) The percentage of uncertainty for V and I is 2% and 6% respectively. Hence, total uncertainty in the value of $R = V/I$ is

(A) 8% ●   (B) $\frac{1}{3}$%   (C) 3%   (D) 4%

2) How many years are there in 1 Second?
(A) $3.15 \times 10^{+7}$ years   (B) 3.1×10^{-8} years   (C) 3.15×10^{16} years   (D) 3.1×10^{-6} years ●

3) A vector of 10N making an angle of 60° with y-axis. Its x-component is equal to
(A) 7 N   (B) 5 N   (C) 8.66 N ●   (D) 10 N

4) When a massive body collides with a body of negligible mass. What is the final velocity of massive body if its initial velocity is 5 m/s
(A) 10 m/s ●   (B) 15 m/s   (C) 20 m/s   (D) Information is not enough

5) Which of the following can be possessed by a moving object
(A) Force   (B) Momentum ●   (C) Impulse   (D) Power

6) The formula $W = \vec{F}.\vec{d}$ have two restrictions. Pick the correct one
(A) $\vec{F}$ can vary but $\vec{d}$ must be in circle ●   (B) $\vec{F}$ can vary but $\vec{d}$ must be in straight line   (C) $\vec{F}$ is constant and average but $\vec{d}$ is in straight line   (D) $\vec{F}$ is constant and average but $\vec{d}$ can be curved

7) θ , ω , α , τ , L all these five parameters can have the same direction only if
(A) Torque should be applied externally   (B) Angular momentum 'L' is not fixed   (C) Angular velocity 'ω' is decreased ●   (D) Angular velocity 'ω' is increased

8) Centripetal force is acted along
(A) Straight line   (B) Curved line   (C) Circular path ●   (D) Elliptical path

9) Bernoulli's theorem can be reduced to
(A) Torricelli's theorem but not to venturi's relation   (B) Both Torricelli's theorem and venturi's relation   (C) Venturi's relation but not to Torricelli's theorem ●   (D) This equation can not be reduced

10) What is the equation of the phase for a vibrating body in a circle, when intial phase is 270°
(A) $x_o \sin \omega t$ (B) $x_o \cos \omega t$ (C) $- x_o \sin \omega t$ ●   (D) $- x_o \cos \omega t$

11) How speed of sound varies with temperature.
(A) $v \propto \frac{1}{T}$ (B) $v \propto 1/\sqrt{T}$ (C) $v \propto T$ ●   (D) $v \propto \sqrt{T}$

12) At which angle, we get more orders of spectra in diffraction
(A) 45°   (B) 90° ●   (C) 60°   (D) 30°

13) If a gas is maintained at 8000 N/m² in a container with piston having area 0.10 m². If the gas expands and piston is pushed up through a distance of 10 cm then the work done by the gas is
(A) 8000 J   (B) 400 J   (C) 40 J ●   (D) 80 J

14) For diatomic gas $C_v = \frac{5R}{2}$, therefore "γ" for this gas is
(A) $7/5$ (B) $5/7$ (C) 7.5 ●   (D) 5.7

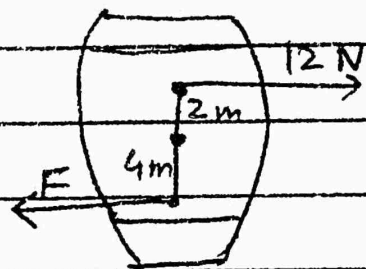1129 - 1124 -- 25000 (1)   P.T.O

15- For rotational equilibrium, the value of force in the following figure is

a) 12 N   b) 4 N

c) 2 N   d) 6 N •

12 N
2 m
E
4 m

16- In the organ pipe shown in the figure has the frequency

a) $f_5 = 5 f_1$ b) $f_9 = 9 f_1$

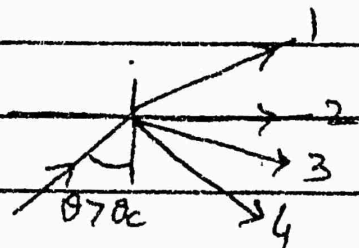c) $f_3 = 3 f_1$ •   d) $f_7 = 7 f_1$

17- If a light ray is incident with an angle higher than critical angle, then the predicted ray of light after incidence

a) light ray follows path 1
b) light ray follows path 2
c) light ray follows path 3
d) light ray follows path 4 •

1
2
3
θ>θc
4

Physics (Subjective) Group (I) (Session 2020-22 to 2023-25) (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) Why do we find it useful to have two units for the amount of substance kilogram and the mole?

(ii) Write the dimensions of pressure and density   (iii) What are supplementary units? Define only one unit.

(iv) Add the following masses given in kg upto appropriate precision. 2.189, 0.089, 11.8 and 5.32?

(v) Under what circumstances would a vector have components that are equal in magnitude?

(vi) What is the unit vector in the direction of the vector $\hat{A} = 4\hat{i} + 3\hat{j}$?

(vii) Is it possible to add a vector quantity to a scalar quantity? Explain.

(viii) What is ballistic missile? Define its trajectory.

(ix) Show that the area between the velocity time graph is numerically equal to the distance covered by the object.

(x) Motion with constant velocity is a special case of motion with constant acceleration. Is this statement true? Discuss.

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

(xii) Differentiate between geyser and aquifer.

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

(i) Why does a diver change his body positions before and after diving in the pool?

(ii) Show that orbital angular momentum, $L_o = mvr$

(iii) State the direction of the following vectors in simple situations; angular momentum and angular velocity.

(iv) Prove that $a_T = r\alpha$ where, a_T = tangential acceleration, r = radius of circle, α = angular acceleration.

(v) Why does droplets appear to be suspended in air?   (vi) What is meant by drag force?

(vii) Name two characteristics of simple harmonic motion.

(viii) Describe some common phenomena in which resonance plays an important role.

(ix) Define the phenomenon of resonance.   (x) Prove that $v = f\lambda$

(xi) Explain why sound travels faster in warm air than in cold air?   (xii) Explain the terms (a) trough (b) Antinode

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

(i) How is the distance between interference fringes affected by the separation between the slits of Young's experiment? Can fringes disappear?

(ii) Write two steps of Huygen's principle. What is its importance.

(iii) How would you distinguish between un-polarized and plane-polarized lights?

(iv) How you can increase the resolving power of a telescope?

(v) How the power is lost in optical fibre through dispersion? Explain.

(vi) A telescope is made of an objective of focal length 30 cm and an eye piece of 5 cm, both convex lenses. Find the angular magnification.

(vii) Give an example of a process in which no heat is transferred to or from the system but the temperature of the system changes.

(viii) How "Human Metabolism" provides an example of energy conservation and satiesfy the first law of thermodynamics.

(ix) What is Boltzman Constant. Calculate its numerical value.

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

5. (a) Define and explain the term torque. Derive expression for torque due to force acting on a rigid body.

(b) Prove that for angles of projection, which exceed or fall short of 45° by equal amounts, the ranges are equal.

6. (a) Discuss interconversion of Potential energy and Kinetic energy.

(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.

7. (a) What is the simple pendulum. Show that the motion of a simple pendulum is simple harmonic. Also derive expression for its time period and frequency.

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

8. (a) Define molar specific heat of gas. Also prove $C_p - C_v = R$

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

9. (a) Describe the working of compound microscope, derive an expression for magnifying power and write the formula of length of compound microscope.

(b) X – rays of wavelength 0.150 nm are observed to undergo a first order reflection at a Bragg angle of 13.3° from a quartz (SiO_2) crystal. What is the interplanar spacing of the reflecting planes in the crystal?

Sargodha Board-G-2-2024

Warning:- Please write your Roll No. in the space provided and sign. Roll No----------------------

..ter Part – I)   (Session 2020-22 to 2023-25)   Sig. of Student ----------------

Physics   (Objective)   (Group II)   Paper (I)

Time Allowed:- 20 minutes   **PAPER CODE 2478**   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) In multimode step index fibre, the diameter of the core is
   (A) $20\mu m$ (B) $30\mu m$ (C) $40\mu m$ (D) $50\mu m$ ●

2) What remains constant in adiabatic process
   (A) Pressure   (B) Volume   (C) Temperature   (D) Entropy ●

3) Triple point of water is
   (A) 273.16 °C   (B) 273.16 °F   (C) 273.16 K ●   (D) 373.16 K

4) Significant figures in 0.00567 are
   (A) 2   (B) 3 ●   (C) 4   (D) 5

5) One light year is equal to
   (A) 9×10^{12} m   (B) 9×10^{13} m   (C) 9×10^{14} m   (D) 9×10^{15} m ●

6) If the magnitude of $\vec{A} \cdot \vec{B} = \frac{1}{2} AB$ then the angle between $\vec{A}$ and $\vec{B}$ is
   (A) 30°   (B) 45°   (C) 60° ●   (D) 90°

7) The dimensions of torque are
   (A) $[M^{-1}LT]$ (B) $[ML^{-1}T]$ (C) $[M^2LT^{-2}]$ (D) $[ML^2T^{-2}]$ ●

8) When a body moves with constant acceleration, The velocity time graph is
   (A) Hyperbola   (B) Parabola   (C) Curve   (D) Straight line ●

9) Which hurt you maximum when the time of collision is
   (A) 1 Sec   (B) $\frac{1}{10}$ Sec   (C) $\frac{1}{100}$ Sec   (D) $\frac{1}{1000}$ Sec ●

10) The value of escape velocity is maximum for
    (A) Earth   (B) Moon   (C) Jupiter ●   (D) Mercury

11) A body of 1kg moving up with a = g then its apparent weight is
    (A) 9.8 N   (B) 98 N   (C) 19.6 N ●   (D) 0.98 N

12) The moment of inertia of a ring is equal to
    (A) $\frac{1}{2}mr^2$ ●   (B) mr^2 (C) $\frac{2}{5}mr^2$ (D) $\frac{1}{4}mr^2$

13) One Torr is equal to
    (A) 1.333 Nm²   (B) 13.33 Nm²   (C) 133.3 Nm² ●   (D) 1333 Nm²

14) By increasing mass of the object four times attatched to a spring time period will become
    (A) Twice ●   (B) Thrice   (C) Four times   (D) Six times

15) The speed of sound in air at 30 °C is approximately equal to
    (A) 332 m/s   (B) 335 m/s   (C) 340 m/s   (D) 350 m/s ●

16) The distance covered by wave in 1 second is
    (A) Wavelength   (B) Wave number   (C) Wave speed ●   (D) Frequency

17) Longitudinal waves do not exhibit
    (A) Polarization ●   (B) Diffraction   (C) Reflection   (D) Refraction

1124 Warning:- Please, do not write anything on this question paper except your Roll No.

Physics (Subjective)   **Group (II)**   (Session 2020-22 to2023-25)   **Paper (I)**

Time Allowed: 2.40 hours   Section ------------------ I   (Inter Part - I) Maximum Marks: 68

$8 \times 2 = 16$

2. **Answer briefly any Eight parts from the followings:-**

(i) What are the three main frontiers of Physics.

(ii) Write two steps which are involved in the measurement of a base quantity.

(iii) Show that the famous "Einstein equation" $E = mc^2$ is dimensionally consistent.

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

(v) How would you explain "arbitrary direction" for a null vector obtained from east and west directed two equal in magnitude vectors.

(vi) The vector sum of three equal in magnitudes vectors gives a zero resultant. What can be the orientation of the vectors.

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

(viii) How do you find out the height of a tower by using one of the equation of motion. Write all steps you take for measurement.

(ix) Derive a formula for range of the projectile.

(x) Why two projectiles fired with different initial horizontal velocities take same time to reach ground?

(xi) What do you understand by the term "escape velocity". Give the value of escape velocity for Earth.

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

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

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

(ii) Differentiate between systolic and diastolic pressure. Are these values varies with age.

(iii) What do you mean by term weightlessness in satellite.

(iv) What is moment of inertia? Explain its significance.

(v) A disc and a hoop starts moving down from top of an inclined plane at the same time which will have great speed on reaching bottom.

(vi) Why an object, orbiting the earth, is said to be freely falling, use your explanation to describe why objects appear weightless under certain circumstances.

(vii) What are the values of velocity of a vibrating mass-spring system at its mean and extreme point.

(viii) What should be the length of a simple pendulum whose time period is 1.0 sec. What does effect on length if time period is doubled.

(ix) Describe phenomenon of tunning a radio.   (x) How beats are useful in tuning musical instrument.

(xi) Is it possible for two identical waves travelling in same direction, will give rise to stationary waves

(xii) In an organ pipe, closed at one end, how does harmonic varies with length of air coulomn.

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

(i) Differentiate between spherical and plane wave front. (ii) Can visible light produce interference fringes?

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

(iv) How a piece of paper is used to see a print clearly?

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

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

(vii) Why does the pressure of a gas in a car tyre increase when it is driven through some distance?

(viii) Why specific heat at constant pressure is greater than specific heat at constant volume?

(ix) How can efficiency of Carnot Engine be increased?

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

5. (a) Define elastic collision. Show that for elastic collision, relative speed of approach is equal to relative speed of separation.

(b) Find the projection of vector $\vec{A} = 2\hat{i} - 8\hat{j} + \hat{k}$ in the direction of the vector $\vec{B} = 3\hat{i} - 4\hat{j} - 12\hat{k}$

6. (a) Define escape velocity. Prove that $v_{esc} = \sqrt{2gR}$ and also find out its value.

(b) Find the temperature at which the velocity of sound in air is two times its velocity at $10\,^{\circ}C$.

7. (a) What is meant by geostationary orbit? Derive formula for its radius.

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

8. (a) What is Carnot engine. Explain its working and calculate its efficiency.

(b) Certain globular protein particle has a density of 1246 kgm^{-3}. It falls through pure water ($\eta = 8.0 \times 10^{-4} kgm^{-1}s^{-1}$) with a terminal speed of 3.0 cmh^{-1}. Find the radius of the particle.

9. (a) Explain the diffraction of X-rays by crystals.

(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 the minimum angle for total internal reflection if pipe is in water? (Refractive Index of water = 1.33)

1132 -- 1124 -- 15000

Sargodha Board-2023

1123 Warning:- Please write your Roll No. in the space provided and sign.   Roll No----------------
(Inter Part – I)   (Session 2019-21 to 2022-24)   Sig. of Student ----------------
Physics   (Objective)   (Group I)   Paper (I)
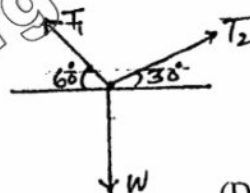Time Allowed:- 20 minutes   **PAPER CODE 2475**   Maximum Marks:- 17

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) In general, the conditions for different orders of minima on either side of centre are given by $d \sin\theta = m\lambda$. Here 'm' is.
   (A) m=±(1,2,3,4, …)   (B) m=±(0,1,2,3,4, …)   (C) m=0,2,4,6,8,….   (D) m=1,3,5,7,….

2) The speed of light in water is
   (A) 2×10^8 ms^{-1} (B) 2.25×10^8 ms^{-1} (C) 2.75×10^8 ms^{-1} (D) 3×10^8 ms^{-1}

3) The change in entropy of the system is important. This statement is just like.
   (A) Potential energy and Kinetic energy   (B) Kinetic energy and internal energy   (C) Potential energy and internal energy   (D) Potential energy, Kinetic energy and internal energy

4) The percentage loss in efficiency in petrol engine is
   (A) 70 % to 75%   (B) 60 % to 65%   (C) 25 % to 30%   (D) 35 % to 40%

5) 73.650 and 64.350 can be rounded off as
   (A) 73.7 and 64.3   (B) 73.6 and 64.4   (C) 73.8 and 64.2   (D) 73.5 and 64.2

6) A number such as 5.0×10^4 cm can be expressed in scientific notation as
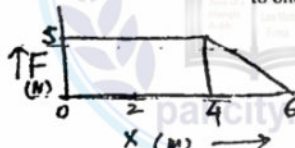   (A) 5.0×10^2 m   (B) 5.0×10^6 m   (C) 5.0×10^4 cm   (D) 5.0×10^{-2} cm

7) If T$_1$=10N and T$_2$=20N. What is the value of weight in the fig.
   (A) 10N   (B) 30 N   (C) 18.66 N   (D) 8.60 N

8) What is the angle for which the values of cross product of two vectors becomes half of original value.
   (A) 90°   (B) 60°   (C) 45°   (D) 30°

9) At which angle, the height and range of projectile becomes equal.
   (A) 76°   (B) 66°   (C) 56°   (D) 46°

10) When a car is moving in a circle then its
   (A) v and a are parallel   (B) v and a are anti parallel   (C) v and a are perpendicular to one another   (D) v is zero but a is not zero

11) What is the work done in this fig
   (A) 5 J   (B) 15 J   (C) 20 J   (D) 25 J

12) A satellite of orbital velocity 7.9 kms^{-1} is taking _____ to complete its circle around Earth.
   (A) 5668 seconds   (B) 84 Seconds   (C) 84 minutes   (D) 5060 minutes

13) When lift is moving upward, then what is the reason of varying weight of a body.
   (A) Acceleration of system becomes more than gravity   (B) Acceleration of system is added in gravity   (C) Acceleration of system is subtracted from gravity   (D) Acceleration of system becomes zero

14) The speed of efflux when fluid is falling through the height 5m. Take g=10ms^{-2}
   (A) 0.5 ms^{-1} (B) 1.0 ms^{-1} (C) 5 ms^{-1} (D) 10 ms^{-1}

15) What is the frequency of an object vibrating at the end of a spring, if the equation for its position is $x = 0.25 \cos\left(\frac{\pi}{2}\right)t$
   (A) 1.0 Hz   (B) 0.5 Hz   (C) 0.25 Hz   (D) 0.1 Hz

16) Laplace consider γ for _____ gas for 333 ms^{-1} speed of sound.
   (A) Monoatomic   (B) Diatomic   (C) Polyatomic   (D) Subatomic

17) For 10°C rise in temperature, the speed of sound becomes.
   (A) 6.1 ms^{-1} (B) 0.61 ms^{-1} (C) 332.1 ms^{-1} (D) 338.1 ms^{-1}

Sargodha Board-2023

Warning:- Please, do not write anything on this question paper except your Roll No.

ysics (Subjective) Group (I)   (Session 2019-21 to 2022-24) (Inter Part - I) Paper (I)

.me Allowed: 2.40 hours   Section ---------------- I   Maximum Marks: 68

2. **Answer briefly any Eight parts from the followings:-**   8 × 2 = 16

(i) What are conditions for a fluid to be ideal?

(ii) How many years are in one second? How many seconds are there in one year?

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

(iv) What are supplemantary units? Explain any one. **(v)** What is rounding off data? Explain.

(vi) Can a body rotate about its centre of gravity under the action of its weight?

(vii) Name the three different conditions that could make $\vec{A}_1 \times \vec{A}_2 = \vec{0}$

(viii) Can the scalar product of two vectors be negative? **(ix)** State law of conservation of linear momentum.

(x) Draw the velocity –time graph for uniformly retarded motion.

(xi) What happens to KE of a fired bullet when it penetrates into a target?

(xii) At What angle of projection, range and vertical height of a projectile are equal?

3. **Answer briefly any Eight parts from the followings:-**   8 × 2 = 16

(i) What is meant by solar constant?

(ii) A girl drops a cup from a certain height, which breaks into pieces. What energy changes are involved?

(iii) 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. **(iv)** Show that $S = r\theta$.

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

(vi) What is meant by angular momentum? **(vii)** Define SHM and give its formula for acceleration.

(viii) Explain the relation between the total energy, potential energy and kinetic energy of a body in SHM.

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

(x) Find the temperature at which the velocity of sound in air is two times its velocity at 10°C .

(xi) What features do longitudinal waves have in common with transverse waves?

(xii) Explain the terms (i) trough (ii) antinode.

4. **Answer briefly any Six parts from the followings:-**   6 × 2 = 12

(i) How is the distance between interference fringes affected by the separation between the slits of Young's experiment?

(ii) Could you obtain newton's rings with transmitted light? If yes, would the pattern be different from that obtained with reflected light?   (iii) Define wave front and a ray of light.

(iv) Explain the difference between angular magnification and resolving power of an optical instrument.

(v) Define critical angle and which formula is used to find critical angle? **(vi)** State Carnot theorem.

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

(viii) A thermos flask containing milk as a system is shaken rapidly. Does the temperature of milk rise?

(ix) As we know PV^γ = Constant. What do you know about "γ"(gama) in this relation?

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

5. **(a)** Define and explain dot product of two vectors. Give two examples and write down its four characteristics.

(b) Ten bricks, each 6.0 cm thick and mass 1.5 kg , lie flat on a table. How much work is required to stack them one on the top of another?

6. **(a)** Define rotational kinetic energy. Also derive the expression for rotational K.E of a disc and a hoop moving down from the top of an inclined plane.

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

7. **(a)** Define terminal velocity and prove that $v_t = \dfrac{2gr^2\rho}{9\eta}$

(b) Estimate the average speed of nitrogen molecules in air under standard conditions of pressure and temperature.

8. **(a)** What is Simple Pendulum , Show that its motion is SHM. Derive an expression for its time period.

(b) Find the temperature at which the velocity of sound in air is two times its velocity at 10°C

9. **(a)** Describe the Young's double slit experiment for demonstration of interference of light. Derive an expression for fringe spacing.

(b) An astronomical telescope having magnifying power of 5 consist of two thin lenses 24 cm apart. Find the focal lengths of the lenses.

1120 -- 1123 -- 25000

Q. 1

1) The shortest distance between two points is called
   (A) speed   (B) Velocity   (C) Acceleration   (D) Displacement

2) The efficiency of diesel engine is
   (A) 80 %   (B) 90 % to 100%   (C) 35% to 40%   (D) 15%

3) The diameter of milky way galaxy is.
   (A) $10^0 \, m$ (B) 10^{30} m   (C) 10^{10} m   (D) 10^{20} m

4) Steradian is the unit of
   (A) Plane angle   (B) Solid Angle   (C) Time   (D) Distance

5) The unit vector is expressed as
   (A) $\hat{A} = |\vec{A}| \times \vec{A}$ (B) $\hat{A} = \vec{A}/|A|$ (C) $\hat{A} = \vec{A} \times |\vec{A}| \times \vec{A}$ (D) $\hat{A} = A \times \vec{A}$

6) Turning effect of force is called.
   (A) Momentum   (B) Acceleration   (C) Torque   (D) Velocity

7) The rate of change of momentum is called.
   (A) Force   (B) Torque   (C) Time   (D) Impulse

8) The increase in entropy means
   (A) disintegration of energy   (B) degradation of energy   (C) degradation of mass   (D) disintegration of mass

9) Biomass is a potential source of
   (A) Energy   (B) Non renewable energy   (C) Renewable Energy   (D) Power

10) One radian is equal to
    (A) 5.73°   (B) 0.73°   (C) 57.3°   (D) 2π

11) Moment of inertia of hoop
    (A) $I = \frac{1}{3} mr^2$ (B) $I = mr^2$ (C) $I = \frac{2}{3} mr^2$ (D) $I = \frac{2}{5} mr^2$

12) The dolphins have
    (A) streamlined bodies   (B) Turbulent bodies   (C) Unsteady bodies   (D) Steady bodies

13) The SI units of spring constant are
    (A) m^{-1} (B) Nm^{-1} (C) Nm^{-2} (D) Nm^2

14) The CRO is a device to display the input signal into
    (A) Pulses   (B) Wave form   (C) Data form   (D) blank form

15) The distance between the node and adjacent antinode is
    (A) $\lambda/2$ (B) $\lambda/4$ (C) λ (D) $\lambda/3$

16) Michel son's interferometer was devised in
    (A) 1864   (B) 1687   (C) 1881   (D) 1786

17) The light signals in optical fibres must be regenerated by a device called.
    (A) Generators   (B) Repeaters   (C) Transmitter   (D) Transistors

.123 **Warning:-** Please, do not write anything on this question paper except your Roll No.

Physics (Subjective)   **Group (II)**   (Session 2019-21 to 2022-24)   **Paper (I)**

Time Allowed: 2.40 hours   **Section ---------------- I**   (Inter Part - I) **Maximum Marks: 68**

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

(i) Why do we find it useful to have two units for the amount of substance, the kilogram and the mole?

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

(iii) Show that the equation $v_f = v_i + at$ is dimensionally correct.

(iv) Given that V=(5.2±0.1) volt. Find its percentage uncertainty.

(v) If two perpendicular vectors have same magnitudes, Find the angle between their sum and difference.

(vi) Define **(a)** position vector and **(b)** unit vector.

(vii) Can a vector have a component greater than the vector's magnitude?

(viii) Explain the circumstances in which the velocity '$\vec{v}$'and acceleration '$\vec{a}$' of a car are. (a) antiparallel (b) $\vec{v}$ is zero but $\vec{a}$ *is not zero*.

(ix) Show that the range of projectile is maximum when projectile is thrown at an angle of 45^0 with the horizontal

(x) How impulse is related to linear momentum? (xi) Explain what do you understand by the term viscosity.

(xii) Prove that for angles of projection which exceed or fall short of 45^0 by equal amounts, the ranges are equal.

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

(i) A girl drops a cup from a certain height, which breaks into pieces. What energy changes are involved.

(ii) What sort of energy is in the following (a) compressed spring (b) water in a high dam.

(iii) Prove that power is dot product of force and velocity.

(iv) State the direction of the following vectors in simple situations; angular momentum and angular velocity.

(v) when mud flies off the tyre of a moving bicycle, in what direction does it fly? Explain.

(vi) Define artificial gravity. Give its significance.

(vii) Of a mass spring system is hung vertically and set into oscillations, why does the motion eventually stop.

(viii) Can we realize an ideal simple pendulum? Explain. (ix) Differentiate between free and forced oscillations?

(x) What features do longitudinal, waves have in common with transverse wave?

(xi) Why does sound travel faster in solids than in gases?

(xii) What is doppler's Effect? Explain briefly one of its application?

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

(i) Can visible light produce interference fringes? Explain.

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

(iii) What is the difference between interference and diffraction of light waves?

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

(v) What is repeater? What it is necessary in optical fibre communication system.

(vi) A thermos flask containing milk as a system is shaken rapidly. Does the temperature of milk rise?

(vii) Does entropy of a system increase or decrease due to friction?

(viii) what are isothermal and adiabatic processes? (ix) Define triple point of water, also write down its value.

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

5. (a) Define Absolute potential energy and derive a relation for it.

   (b) The magnitude of dot and cross products of two vectors are $6\sqrt{3}$ and 6 respectively. Find the angle between the vectors.

6. (a) What is centripetal force? Work out an expression for centripetal force of an object of mass 'm' moving with constant speed 'v' in a circle of radius 'r'.

   (b) A football is thrown upwards 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?

7. (a) What is carnot engine. Explain its cycle and derive formula for efficiency.

   (b) Water flows through a hose whose internal diameter is 1 cm 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}.

8. (a) What is simple pendulum? Show that motion of pendulum is S.H.M. Also find relations for its time period and frequency.

   (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 wave length and the fundamental frequency.

9. (a) Explain the construction and working of a compound microscope. Drive expression for its magnification.

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

Sargodha Board-2022

122 Warning:- Please write your Roll No. in the space provided and sign.   Roll No-------------
(Inter Part – I)   (Session 2018-20 to 2021-23)   Sig. of Student ------------
Physics (Objective)   (Group I)   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) SI system is built up by how many kinds of units.
   (A) Six   (B) Five   (C) Four   (D) Three

2) The dimension of power is
   (A) $[MLT^{-1}]$ (B) $[ML^2T^3]$ (C) $[ML^2T^{-1}]$ (D) $[MLT^{-2}]$

3) If $\vec{A} = 2\hat{i} - \hat{j} + 3\hat{k}$ then magnitude of $\vec{A}$ is
   (A) 4   (B) 14   (C) $\sqrt{14}$ (D) 6

4) If $A_x = A_y$ the angle between $\vec{A}$ and x-axis is
   (A) $30°$ (B) $45°$ (C) $60°$ (D) $90°$

5) When an object is moving towards earth the value of g is taken as
   (A) Positive   (B) Negative   (C) Zero   (D) Variable

6) A same force is applied on different masses m_1 and m_2 moving with accelrations a_1 and a_2 identify the correct relation.
   (A) $\frac{m_1}{m_2} = \frac{a_1}{a_2}$ (B) $\frac{m_2}{m_1} = \frac{a_2}{a_1}$ (C) $\frac{m_1}{m_2} = \frac{a_2}{a_1}$ (D) $m_1 a_2 = m_2 a_1$

7) Power is also defined as dot product of
   (A) $\vec{F} \cdot \vec{m}$ (B) $\vec{F} \cdot \vec{d}$ (C) $\vec{F} \cdot \vec{v}$ (D) $\vec{F} \cdot \vec{t}$

8) Magnitude of centripetal force on a mass m moving with angular speed ω in a circle of radius r is
   (A) $mr^2\omega$ (B) $\frac{m\omega^2}{r}$ (C) $mr\omega^2$ (D) $mr^2\omega^2$

9) Accelration of a free falling body is
   (A) $+9.8 \, m/s^2$ (B) zero   (C) $-9.8 \, m/s^2$ (D) $19.6 \, m/s^2$

10) The product of crossectional area of pipe and fluid speed along a pipe always
    (A) Zero   (B) Variable   (C) Constant   (D) $9.8 \, ms^{-2}$

11) One complete round trip of vibrating body is called
    (A) Time period   (B) Frequency   (C) Vibration   (D) Amplitude

12) The velocity of sound is maximum in
    (A) Air   (B) Nitrogen   (C) Metal   (D) Glass

13) Number of nodes between two consective antinodes is
    (A) Zero   (B) 3   (C) 2   (D) 1

14) Newton rings are formed due to
    (A) Diffraction   (B) Refraction   (C) Reflection   (D) Interference

15) How many types of optical fibre are in use
    (A) One   (B) Two   (C) Three   (D) Four

16) For one mole of The gas equation becomes.
    (A) PV = nRT   (B) PV = 3RT   (C) PV = mRT   (D) PV = RT

17) Highest efficiency of heat engine whose lower temperature is 17 °C and higher temperature is 200 °C is
    (A) 70 %   (B) 100 %   (C) 38 %   (D) 35 %

1122 Warning:- Please, do not write anything on this question paper except your Roll No.

Physics (Subjective) Group (I)   (Session 2018-20 to 2021-23) (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 × 2 = 16

(i)   Give the drawbacks to use the period of a time standard.

(ii)   Does a dimensional analysis give any information on constant of proportionality that may appear in an algebraic expressions?

(iii) Give any two conventions for indicating units.   **(iv)** What is scientific notation? Give example.

(v)   Motion with constant velocity is a special case of motion with acceleration. Is this statement true? Discuss.

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

(vii) How would you elaborate the importance of head-rest of the car seat?

(viii) When a massive body collides with light stationary body then how would you predict the result?

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

(x)   Why does the pressure of a gas in a car tyre increase when it is driven through some distance?

(xi)   How would you relate work with change in volume. Derive the relation.

(xii) Energy can be added to a system when no heat transfer takes place. Is this statement true? Support your response with an example.

3.   **Answer briefly any Eight parts from the followings:-**   8 × 2 = 16

(i)   Is it possible to add a vector quantity to a scalar quantity? Explain.

(ii)   Two vectors have unequal magnitudes. Can their sum be zero? Explain.

(iii) Show by diagram, The vector addition is commutative.

(iv)   A girl drops a cup from a certain height, which breaks into pieces. What energy changes are involved?

(v)   A person holds a bag of groceries while standing still, a car is stationary with its engine running. From the stand point of work, how are these situations similar?

(vi)   Differentiate between geyser and aquifer.

(vii) Why does a diver change his body positions, before and after diving in the pool?

(viii) Prove that 1 radian = 57.3°   **(ix)** Write down applications of communication satellites.

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

(xi)   Define thin film. Write its two examples. **(xii)** What aspect of nature of light is proved by phenomena of polarization?

4.   **Answer briefly any Six parts from the followings:-**   6 × 2 = 12

(i)   How the swing is produce in a fast moving cricket ball?   **(ii)** Can we realize an ideal simple pendulum?

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

(iv)   How are beats useful in tunning the musical instruments?

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

(vi)   Does frequency depends on amplitude for harmonic oscillators?

(vii) What are damped oscillation?   **(viii)** Define electromagnetic waves. Write example.

(ix)   Define Snell's Law.

Note: **Attempt any three questions.**   Section ------------------ II   (8 × 3 = 24)

5.   (a)   Define gravitational field prove that work done in the gravitational field is independent of path followed by the body.

      (b)   The line of action of a force $\vec{F}$ passes through a point P of a body whose position vector in meter is $\hat{i} - 2\hat{j} + \hat{k}$. If $\vec{F} = 2\hat{i} - 3\hat{j} + 4\hat{k}$ (N) determine the torque about the point 'A' Whose position vector is $2\hat{i} + \hat{j} + \hat{k}$ (in m)

6.   (a)   Why geostationary orbits are important? Derive relation and find radius of the geostationary orbit.

      (b)   A ball is thrown with a speed of 30 ms^{-1} in the direction 30° above the horizon. Determine the horizontal range.

7.   (a)   State and derive "Bernoulli's Equation" of fluid dynamics.

      (b)   Find the temperature at which the velocity of sound in air is two times its velocity at 10 °C.

8.   (a)   Derive the relations for time period, displacement and velocity in horizontal mass spring system?

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

9.   (a)   Define molar specific heat capacity and show that $C_p - C_v = R$

      (b)   A Simple astronomical telescope in normal adjustment has an objective of focal length 100 cm and an eye-piece of focal length 5.0 cm. (i) Where is the final image formed? (ii) Calculate the angular magnification.

1122. **Warning:-** Please write your Roll No. in the space provided and sign. Roll No.—————————
(Inter Part – I)   (Session 2018-20 to 2021-23)   Sig. of Student —————————

Physics   (Objective)   **(Group II)**   **Paper (I)**

Time Allowed:- 20 minutes   **PAPER CODE 2476**   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) Efficiency of steam locomotive is
(A) 10 %   (B) 7 %   (C) 9 %   (D) 8 %

2) The famous book Principia written in
(A) 1787   (B) 1607   (C) 1687   (D) 1534

3) The total base units are
(A) 7   (B) 6   (C) 5   (D) 4

4) If $\vec{A} + \vec{B} = \vec{B} + \vec{A}$ vector addition is
(A) Associative   (B) Commutative   (C) Additive   (D) Additive Inverse

5) Which relation is true for Newton 2nd Law
(A) $m = \dfrac{a}{F}$ (B) $F = \dfrac{m}{a}$ (C) $a = \dfrac{F}{m}$ (D) $a = \dfrac{m}{F}$

6) One watt hour is equal to
(A) 3.6 MJ   (B) 3.6 KJ   (C) 36 KJ   (D) 36 MJ

7) The dimension of angular acceleration is
(A) $[T^{-1}]$ (B) $[LT^{2}]$ (C) $[T^{-2}]$ (D) $[T^{-3}]$

8) Terminal velocity is related with the radius r of a spherical object is
(a) $V_t \propto r^2$ (b) $V_t \propto r$ (c) $V_t \propto \dfrac{1}{r}$ (d) $V_t \propto \dfrac{1}{r^2}$

9) If F=0.08 N and $x = 4$ cm then k is
(A) 56 Nm^{-1} (B) 5.6 Nm^{-1} (C) 23 Nm^{-1} (D) 2 Nm^{-1}

10) The speed of sound is greater in solid due to their high
(A) Density   (B) Pressure   (C) Temperature   (D) Elasticity

11) Soap film shows colour due to
(A) Interferrance   (B) Diffraction   (C) Polarization   (D) Reflection

12) Refractive Index is given by n =
(A) $\dfrac{c}{v}$ (B) $\dfrac{v}{c}$ (C) $\sqrt{\dfrac{c}{v}}$ (D) $\sqrt{\dfrac{v}{c}}$

13) The tripple point of water is
(A) 273.16 $°F$ (B) 273.16 $°C$ (C) 273.16 K (D) 373.16 K

14) The dimension of mc^2 is equal to
(A) Force   (B) Momentum   (C) Time Period   (D) Torque

15) $(\hat{i} \times \hat{j}) \times \hat{k} + (\hat{j} \times \hat{j}) \times \hat{i}$ will be
(A) $-\hat{j}$ (B) $\hat{j}$ (C) 0   (D) $-\hat{i}$

16) Speed of hoop at the bottom of an inclined plane is
(A) $\sqrt{gh}$ (B) $\sqrt{2gh}$ (C) $\sqrt{\dfrac{4}{3}gh}$ (D) $\sqrt{4gh}$

17) Star moving away from earth shows
(A) Green shift   (B) Red Shift   (C) Blue Shift   (D) Yellow Shift

1117 - 1122 - 21000 (3)

1122   Warning:- Please, do not write anything on this question paper except your Roll No.

Physics (Subjective)   Group (II)   (Session 2018-20 to 2021-23)   Paper (I)

Time Allowed: 2.40 hours   Section --------------- I   (Inter Part - I) Maximum Marks: 68

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

(i)   Check the correctness of the relation $V = \sqrt{\dfrac{F \times l}{m}}$ where V is the speed of transverse wave on a

   stretched string of tension F, length l and mass m.

(ii)   Add the following masses given in Kg upto appropriate precision 2.189, 0.089, 11.8 and 5.32

(iii)   Define radian and steradian.

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

(v)   Derive an expression for the time of flight of projectile.

(vi)   Show that the range of projectile is maximum when projectile is thrown at an angle of 45° with horizontal.

(vii)   Water flows out from a pipe at 3 kgs^{-1} and its velocity changes from 5 ms^{-1} to zero on striking the

   wall then find the force due to water flow.

(viii)   A 100 g golf ball is moving to the right with a velocity of 20 ms^{-1}. It makes head on collision with

   an 8 kg steel ball, initially at rest. Compute velocity of the golf ball after collision.

(ix)   Define First and Second law of thermodynamics.   (x) Prove that $W = -\Delta U$ for adiabatic expansion process

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

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

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

(i)   How we can find the direction of torque of rotating fan? Explain.

(ii)   Can a body rotates about its centre of gravity under the action of its weight?

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

(iv)   What is the SI units of work? and also define it.   (v) Show that orbital angular momentum $L_o = mvr$.

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

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

(viii)   Why does a diver change his body positions before and after diving in the pool?

(ix)   Prove that 1 rad = 57.3°.   (x) Why the polaroid sunglasses are better than ordinary sunglasses?

(xi)   How would you distinguish between un-polarized and plane-polarized lights?

(xii)   What is meant by diffraction of light?

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

(i)   When water falls from a tap; its cross-sectional area decreases as it comes down? Explain.

(ii)   Name two characteristics of simple harmonic motion (SHM)

(iii)   Show that P.E of mass-spring system is $P.E = \dfrac{1}{2} m \omega^2 x^2$

(iv)   What is meant by second pendulum? Calculate its length at the earth surface.

(v)   Why sound travels faster in warm air than in cold air?   (vi) State principle of superposition of waves.

(vii)   What is "Doppler Effect"? Does it hold for both sound and light waves?

(viii)   How the power is lost in optical fibre through dispersion? Explain.   (ix) Name the essential parts of spectrometer.

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

5.   (a)   Discuss the inter conversion of potential energy and kinetic energy when friction force is not considered.

   (b)   Find the angle between the two vectors: $\vec{A} = 5\hat{i} + \hat{j}$ $\vec{B} = 2\hat{i} + 4\hat{j}$

6.   (a)   Define centripetal force and derive its formula.

   (b)   A truck weighing 2500 kg and moving with a velocity 21 ms^{-1} collides with a stationary car weighing
   1000 kg. The truck and the car move together after the impact. Calculate their common velocity.

7.   (a)   Derive equation of continuity for non-viscous and incompressible fluid flowing steadily. Also discuss its physical significance.

   (b)   An organ pipe has a length of 50 cm. Find the frequency of its fundamental note and the next harmonic
   when it is (a) open at both ends   (b) closed at both ends. (speed of sound = 350 m/s)

8.   (a)   Show that total energy of vibrating mass and spring system remains constant.

   (b)   A second order spectrum is formed at an angle of 38.0° when light falls normally on a
   diffraction grating having 5400 lines per centimetre. Determine wavelength of light used.

9.   (a)   What information would you use to prioritize compound microscope over simple microscope. Also,
   derive a relation for the magnification of compound microscope.

   (b)   What is the average translational kinetic energy of molecules in a gas at temperature $27^\circ C$?

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 uncertainity 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 that 45°, 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 ms⁻¹ in a direction 30° above the Horizontal. Its vertical component velocity is
   (A) 25.98 ms⁻¹ (B) 30 ms⁻¹ (C) 10 ms⁻¹ (D) 15 ms⁻¹

7) In work-Energy principle work done on a body is equal to
   (A) Kinetic energy (B) Potential energy (C) Plan potential 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° (B) 360° (C) 90° (D) 180°

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 increases or decreases (D) Remaining constant

14) A Diffraction grating has 3000 lines per centimeter, its grating element is
    (A) $3.33 \times 10^{-4} cm$ (B) $3.33 \, m$ (C) $333 \times 10^{-4} cm$ (D) $3.33 \, cm$

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

1121 Warning:- Please, do not write anything on this question paper except your Roll No.

hysics (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

(ii) Does a dimensional analasis give any information on constant of proportionality that may appear in an algebric 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 it's path does a projectile have it's minimum speed, its maximum speed.

(x) Define time of flight of a projectile, give it's 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 ms^{-1}. How far off it hit the ground and that 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 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 at bottem.

  (b) How large must a heating duct be if air moving 3 ms^{-1} along it can replenish the air in a room of 300 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°.

Sargodha Board-2021

1121 Warning:- Please write your Roll No. in the space provided and sign.   Roll No--------------------
(Inter Part – I)   (Session 2017-19 to 2020-22)   Sig. of Student   ----------------

Physics   (Objective)   (**Group II**)   **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) $F = \dfrac{ma}{t}$ (C) $F = \dfrac{mv}{t}$ (D) $F = \dfrac{mt}{v}$

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) $\dfrac{1}{4}mv^2$ (B) $\dfrac{1}{2}mv^2$ (C) $\dfrac{1}{2}mr^2$ (D) $\dfrac{1}{4}mr^2$

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) $\dfrac{1}{2}K x_o^2$ (B) $K x^2$ (C) mgh   (D) $\dfrac{1}{2}K x^2$

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 errect   (B) Virtual and Inverted   (C) Real and Inverted   (D) Virtual and errect

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

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

Time Allowed: 2.40 hours   **Section ---------------- I**   (Inter Part - I) Maximum Marks: 68

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

(i)   What are the uses of dimensions? **(ii)** Distinguish between procision and Accuracy.

(iii)   What are the dimensions of gravitational constant G in formula $F = G\dfrac{m_1 m_2}{r_2}$

(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 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 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 followings:-** $6 \times 2 = 12$

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

(ii)   How would you manage to get more orders of spectra 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 $U_g = \dfrac{-GMm}{R}$

   (b)   Find the temperature at which the velocity of sound in air is two times its velocity at 10 °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 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 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.

Physics (Objective)   (Group I)   Paper (I)

PAPER CODE 2471

Time Allowed:- 20 minutes   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) The term 134.7 can be written in scientific notation as
   (A) 1.347×10^2 (B) 1.347×10^3 (C) 1.347×10^1 (D) 1.347×10^4

2) The quantity 0.00467 has significant figures
   (A) 3   (B) 4   (C) 5   (D) 6

3) If the two components of a vector are equal in magnitude, the vector making angle with x-axis will be
   (A) $30°$ (B) $45°$ (C) $60°$ (D) $90°$

4) Two forces of magnitudes 10 N and 20 N act on a body in directions making angle of $30°$, The X-component of the resultant force will be
   (A) 25.98 N   (B) 30.98 N   (C) 20.98 N   (D) 17.98 N

5) If maximum height of the projectile is equal to the range then angle of projection of projectile will be
   (A) $30°$ (B) $60°$ (C) $45°$ (D) $76°$

6) If 50 kg crate is pushed through 2 m across the floor with a force of 50 N, the work done will be
   (A) 245 J   (B) 150 J   (C) 200 J   (D) 100 J

7) A body rotates with a constant angular velocity of 100 rad/sec about a vertical axis the required torque to sustain this motion will be
   (A) Zero Nm   (B) 100 Nm   (C) 200 Nm   (D) 300 Nm

8) Moment of inertia of 100 kg sphere having radius 50 cm will be
   (A) $10 \, Kg \, m^2$ (B) $5 \, Kg \, m^2$ (C) $500 \, Kg \, m^2$ (D) $2.5 \, Kg \, m^2$

9) Laminar flow occurs at
   (A) High speed   (B) Low speed   (C) Zero speed   (D) Very high speed

10) High concentration of red blood cells increases the viscosity of blood from
    (A) 2 – 3 times that of water   (B) 3 – 5 times that of water   (C) 5 – 7 times that of water   (D) 7 – 9 times that of water

11) Distance covered by a body in one vibration is 20 cm. The amplitude of the vibration will be
    (A) 10 cm   (B) 5 cm   (C) 15 cm   (D) 20 cm

12) Speed of sound in Hydrogen is higher than in Oxygen by times
    (A) 4   (B) 6   (C) 8   (D) 16

13) Sound waves can not pass through
    (A) Liquid   (B) Solids   (C) Air   (D) Vacuum

14) Which of the followings can not produce colours with white light?
    (A) Diffraction   (B) Interference   (C) Polarization   (D) Dispersion

15) The image formed by eyepiece of compound microscope is
    (A) Real and magnified   (B) Real and diminished   (C) Virtual and enlarge   (D) Virtual and diminished

16) The direction of flow of heat between two bodies in thermal contact is determined by
    (A) Internal energies   (B) Kinetic energies   (C) Potential energies   (D) Atmospheric pressure

17) A carnot engine has an efficiency of 50% when its sink temperature is $27°C$. The temperature of source is
    (A) $300°C$ (B) $327°C$ (C) $373°C$ (D) $273°C$

1119 Warning:- Please, do not write anything on this question paper except your Roll No.

Physics (Subjective) Group (I) (Session 2015-17 to 2018-20) (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 any two points which should be kept in mind, while using units.

(ii) How many micro seconds in one year? **(iii)** Find the angle between $\vec{A} = 2\hat{i} - 2\hat{j}$ and $\vec{B} = 2\hat{i} + 2\hat{j}$

(iv) Can the magnitude of a vector ever be zero? Explain.

(v) What are the steps, taken to add vectors by rectangular components?

(vi) In which case more work is done, when a 50 kg crate is pushed through 10 m across a floor with a force of 30 N or same crate is lifted through 5 m height?

(vii) Derive work-energy principle. **(viii)** Explain, how the swing is produced in a fast moving tennis ball?

(ix) What you know about viscosity and what is its effect on drag force?

(x) What are the factors on which frequency of a spring-mass system depends?

(xi) What is the difference between free and driven harmonic oscillators? **(xii)** Explain phase and initial phase.

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

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

(ii) Define impulse and show how it is related to linear momentum?

(iii) What does the slope of velocity-time graph represent?

(iv) An object is thrown vertically upward. Discuss the sign of acceleration due to gravity, relative to velocity, while the object is in air.

(v) Define angular velocity. How its direction is determined? **(vi)** Prove that 1 $radian = 57.3^\circ$

(vii) When mud flies off the tyre of a moving bicycle. In what direction does it fly? Explain.

(viii) Show that angular momentum, $L_o = mvr$ **(ix)** What is difference between interference and beats

(x) What is the difference between constructive and distructive interference?

(xi) Explain why sound travels faster in warm air than in cold air?

(xii) How should a sound source move with respect to an observer so that the frequency of its sound does not change?

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

(i) Can visible light produce interference fringes? Explain.

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

(iii) How coherent light beams can be produced? Explain. **(iv)** How the light signal is transmitted through the optical fibre?

(v) How can the resolving power of compound microscope be increased?

(vi) Specific heat of a gas at constant pressure is greater than specific heat at constant volume. Why?

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

(viii) What would be average speed of oxygen molecule in the air at S.T.P?

(ix) Differentiate between isothermal and adiabatic process.

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

5. **(a)** What is Carnot engine? Discuss carnot cycle, also derive expression of its efficiency.

(b) Suppose, we are told that the acceleration of a particle moving in a circle of radius r with uniform speed 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?

6. **(a)** What is isolated system? Also state and explain the law of conservation of linear momentum.

(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 vector $(\vec{r_2} - \vec{r_1})$ and its orientation with respect to x-axis.

7. **(a)** Define Doppler effect. Discuss the case when source moves towards the stationary observer and when observer moves towards the stationary source.

(b) A brick of mass 2 kg is dropped from a rest position 5 m above the ground. What is its velocity at height of 3 m above the ground.

8. **(a)** What is meant by gravity free system. How gravity like earth is produced in a space ship? Explain.

(b) A simple pendulum is 80 cm long what will be its period and frequency at a place where $g = 9.8 ms^{-2}$

9. **(a)** What is magnifying glass? How is it used as a microscope? Derive the relation for its magnifying power?

(b) In a double slit experiment, the second order maximum occurs at $\theta = 0.25^\circ$, The wavelength is 700 nm. Determine its slit separation?

(Inter Part – I)   (Session 2015-17 to 2018-20)   Sig. of Student ----------------

Physics (Objective)   (Group II)   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) Absolute uncertainty in a measuring instrument is equal to
   (A) Least count   (B) Accuracy   (C) Fractional uncertainty   (D) Percentage uncertainty

2) Dimension of moment arm is
   (A) [M]   (B) [T]   (C) [LT]   (D) [L]

3) The force of 15 N makes an angle of 90° with x-axis, its y- component is
   (A) 15 N   (B) Zero N   (C) 30 N   (D) 45 N

4) The position vector $\vec{r}$ in xz- plane is
   (A) $y\hat{i} + z\hat{k}$ (B) $x\hat{i} + y\hat{k}$ (C) $x\hat{i} + z\hat{k}$ (D) $x\hat{i} + y\hat{j} + z\hat{k}$

5) Area between the velocity time graph is equal to
   (A) Time   (B) Velocity   (C) Distance   (D) Mass

6) When the finite force is parallel to the direction of motion of the body, the work done is
   (A) Minimum   (B) Maximum   (C) Infinity   (D) Varies

7) A body of mass 10 kg in free falling lift has weight
   (A) 10 N   (B) 9.8 N   (C) Zero N   (D) 980 N

8) 20 N centripetal Force revolving a body along a circular path of radious 1m, the work done by the centripetal Force is
   (A) 20 Joule   (B) 40 Joule   (C) 10 Joule   (D) Zero Joule

9) Stoke's Law hold for bodies when they have
   (A) Spherical shape   (B) Curved shape   (C) Rectangular shape   (D) Oblong shape

10) One Torr is equal to
   (A) 120 Pascals   (B) 100 Pascals   (C) 133.3 Pascals   (D) 80 Pascals

11) A simple pendulum is completing 20 vibration in 5 seconds, its frequency is,
   (A) 4 Hz   (B) 20 Hz   (C) 200 Hz   (D) 40 Hz

12) The Product of frequency and Time Period is
   (A) 2   (B) 3   (C) 1   (D) 1 Hertz

13) Two tuning forks of frequencies 261 Hz and 258 Hz are sounded together, the number of beats per second are
   (A) 3   (B) 2   (C) 261   (D) 258

14) Which of the following waves can not be polarized
   (A) X-Rays   (B) Light waves   (C) Sound waves   (D) Infrared rays

15) If a convex Lens of focal length " f " is cut into two identical halves along the Lens diameter, the focal length of each half is
   (A) $\frac{3}{2}f$ (B) $2f$ (C) $\frac{f}{2}$ (D) f

16) Solid ice, Liquid water and water vapours consist in thermal equilbrium at a Temperature
   (A) 273 K   (B) 273.16 K   (C) 273 °C   (D) 100 °C

17) The Sum of all the energies of molecules is known as
   (A) Elastic potential energy   (B) Kinetic energy   (C) Internal energy   (D) Gravitational potential energy

1119   Warning:- Please, do not write anything on this question paper except your Roll No.

Physics (Subjective)   Group (II)   (Session 2015-17 to 2018-20)   Paper (I)

Time Allowed: 2.40 hours   Section ------------------ I   (Inter Part - I) Maximum Marks: 68

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

(i) Write two differences between base and derived quantities?

(ii) Name several repetitive phenomena occuring in nature which could serve as reasonable time standard?

(iii) Under what circumstances would a vector have components that are equal in magnitude?

(iv) Define component of a vector? What are rectangular components?

(v) If all the components of a vector $\vec{A}_1$ and $\vec{A}_2$ were reversed, how would this alter $\vec{A}_1 \times \vec{A}_2$?

(vi) Define conservative field. Give example.   (vii) What is Venturi Relation? Explain briefly.

(viii) What is drag force? On what factors does it depend?

(ix) Show that 1kWh = 3.6 M J   (x) Derive the relation $\omega = \sqrt{\dfrac{k}{m}}$ (xi) What is resonance? Example must be given?

(xii) Does the acceleration of a simple harmonic oscillator ever remain constant? Explain.

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

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

(ii) Define impulse and show that how it is related to linear momentum?

(iii) Show that the range of projectile is maximum when projectile is thrown at an angle of 45^u with horizontal.

(iv) Differentiate between Ballistic and non-ballistic projectiles.

(v) What is meant by moment of inertia? Explain its significance.

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

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

(viii) Define the terms (a) Gravitation, and (b) Geodesics

(ix) What features do longitudinal waves have in common with transverse waves?

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

(xi) Why does sound travel faster in solids than in gases? (xii) Differentiate between "Red Shift" and "Blue Shift"

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

(i) What is meant by a wavefront?   (ii) Can visible light produce interference fringes? Explain.

(iii) The centre of Newton's rings is dark. Why? (iv) What are the two conditions for total internal reflection to take place?

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

(vi) Specific heat of a gas at constant pressure is greater than specific heat at constant volume. Why?

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

(viii) Explain why adiabatic is steeper than an isotherm?

(ix) Can the mechanical energy be converted completely into heat energy? If so give an example.

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

5. (a) What is the main difference between petrol engine and diesel engine? Also describe petrol engine elaborating its four strokes.

(b) The diameter and length of a metal cylinder measured with the help of vernier callipers of least count 0.01 cm are 1.22 cm and 5.35 cm. Calculate the volume of cylinder and uncertainty in it.

6. (a) Derive expressions for the magnitude and direction of resultant of two vectors, added by rectangular component method.

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

7. (a) Define the conservative field. Prove that the work done in the earth's gravitational field is independent of the path followed.

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

8. (a) Derive an expression for the radius of orbit of a geo-stationary satellite.

(b) A block of mass 4 kg is dropped from a height of 0.8 m on to a spring of spring constant $K = 1960 \dfrac{N}{m}$. Find the maximum distance through which spring will be compressed.

9. (a) Explain compound microscope using suitable diagram. Derive formula for its angular magnification.

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

pakcity.org

SECTION II

5- (a) What is projectile motion? Derive the relation for maximum height and range of projectile.   **5**

(b) Two forces of magnitude 10 N and 20 N act on a body in direction making angles 30° and 60° respectively with x-axis. Find the resultant force and direction.   **3**

6- (a) What is meant by centripetal force? Show by mathematical proof that $a_c = \dfrac{V^2}{r}$ **5**

(b) A car of mass 800 kg travelling at 54 kmh^{-1} is brought to rest in 60 meters. Find the average retarding force on the car. What has happened to original kinetic energy?   **3**

7- (a) State and derive Bernoulli's relation for a liquid in motion.   **5**

(b) Calculate the entropy change when 1.0 kg ice at 0^oC melts into water at 0^oC. Latent heat of fusion of ice $L_f = 3.36 \times 10^5$ JKg^{-1}.   **3**

8- (a) Speed of sound in air at 0^oC is determined by Newton's formula $V = \sqrt{\dfrac{P}{\rho}}$. Why this formula could not give accurate velocity? Derive the correct formula by using Laplace correction.   **5**

(b) What should be the length of a simple pendulum whose period is 1.0 second at a place where $g = 9.8$ ms^{-2}.   **3**

9- (a) What is astronomical telescope? Draw its ray diagram and derive relation for its magnification.   **5**

(b) Light of wavelength 450 nm is incident on a diffraction grating on which 5000 lines/cm have been ruled. Calculate angles for first three orders of diffraction.   **3**

221-318-58000

1118   Warning:- Please write your Roll No. in the space provided and sign.   Roll No----------------

(Inter Part – I)   (Session 2015-17 to 2017-19)   Sig. of Student ----------------

Physics   (Objective)   **(Group I)**   Paper (I)

Time Allowed:- 20 minutes   **PAPER CODE 2473**   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) Average Translational KE of a gas molecule is

   (A) $\frac{3}{2}KT$ (B) $\frac{2}{3}KT$ (C) $\frac{1}{2}KT$ (D) KT

2) A heat engine operates between temperatures 400 K and 1000 K, its efficiency is equal to

   (A) 50 %   (B) 60 %   (C) 70 %   (D) 70 %

3) The percentage error in measuring mass and speed is 2% and 3% respectively. The maximum percentage uncertainity (error) in the measurement of Kinetic Energy is

   (A) 5 %   (B) 11 %   (C) 8 %   (D) 7 %

4) In $5.47 \times 19.89 = 108.7983$; answer should be written as

   (A) 108.8   (B) 108.9   (C) 109   (D) 108.79

5) A force for 100 N makes an angle of 60° with Y-axis, its horizontal component is

   (A) 50 N   (B) 60 N   (C) 70.7 N   (D) 86.6 N

6) The direction of torque is

   (A) Along the position vector $\vec{r}$ (B) Perpendicular to both $\vec{r}$ and $\vec{F}$ (C) Along the direction of force $\vec{F}$ (D) Opposite to the direction of $\vec{r}$

7) The maximum range of a projectile is 100 km. Take $g = 10\,ms^{-2}$ The initial velocity of the projectile will be

   (A) 1000 kms^{-1} (B) 1 kms^{-1} (C) 10 kms^{-1} (D) 100 kms^{-1}

8) Dimensions of power is

   (A) $[ML^2T^{-2}]$ (B) $[ML^2T^{-1}]$ (C) $[ML^2T^{-1}]$ (D) $[ML^2T^{-3}]$

9) $\omega = 60\,rev\,min^{-1}$ is equal to

   (A) $\pi\,rad\,s^{-1}$ (B) $2\pi\,rad\,s^{-1}$ (C) $\frac{1}{\pi}\,rad\,s^{-1}$ (D) $\frac{2}{\pi}\,rad\,s^{-1}$

10) Height of geostationary satellite from the earth's surface is

   (A) 42300 km   (B) 900 km   (C) 36000 km   (D) 400 km

11) Let A = Area of crossection of pipe   V = speed of fluid then 'Av' is called

   (A) Volume flow rate   (B) Energy flow rate   (C) Mass flow rate   (D) Pressure flow rate

12) Maximum velocity in SHM is

   (A) $x_o\omega^2$ (B) $x_o\omega$ (C) $x\omega$ (D) $x_o^2\omega$

13) Stars moving away from earth shows

   (A) Blue Shift   (B) Red Shift   (C) Yellow Shift   (D) Green Shift

14) Sound waves are

   (A) Electromagnetic waves   (B) Transverse waves   (C) Compressional waves   (D) Matter waves

15) Angle between a ray and wavefront is

   (A) 180°   (B) 0°   (C) 90°   (D) 45°

16) When Newton's Rings are seen through the transmitted light, then the central spot is

   (A) Dark   (B) Blue   (C) Bright   (D) Red

17) In newer Optical fiber systems, repeaters are placed at

   (A) 300 km   (B) 100 m   (C) 30 km   (D) 100 km

1118 Warning:- Please, do not write anything on this question paper except your Roll No.

Physics (Subjective) Group (I) (Session 2015-17 to 2017-19) (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) How many years are there in a neno second? (ii) Define radian and stradian and give their units.

(iii) Discuss two frontiers of Science. (iv) Find the dimensions of 'G' using equation $F = G \dfrac{m_1 m_2}{r^2}$

(v) Explain how a vector can be subracted from the other vector?

(vi) A force of 10N makes an angle of 60° with x-axis. Find its x and y - components.

(vii) Prove that dot product is commutative.

(viii) Define average and instentaneous velocity. Also give their units.

(ix) Calculate the distance covered by a free falling body during first second of its motion.

(x) Show that range of projectile is maximum when it is thrown at an angle of 45° with horizontal.

(xi) Explain how the lift is produced in an aeroplane? (xii) Why fog droplets appear to be suspended in air?

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 2 m across the floor with force of 50 N.

(ii) What sort of energy is in the following.

(a) Compressed spring   (b) Water in high dam   (c) A moving car.

(iii) Prove that $\vec{F} . \vec{V} = Power$

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

(v) Find the rotational kinetic energy of disc.   (vi) Why the microwaves are used in satellite communication.

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

(viii) What happens to the period of simple pendulum if its length is doubled. What happen if the suspended mass is doubled?

(ix) State the Hook's Law, write it in mathematical form.   (x) How are beats useful in tuning musical instrument?

(xi) Explain the term node and anti-node.   (xii) How Doppler's effect is applied to a radar system?

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

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

(ii) State Huygen's principle.   (iii) Define wavefronts and ray of light.

(iv) Explain the difference b/w angular magnification and resolving power.

(v) How the Power is lost in optical fibre through dispersion? Explain.

(vi) A thermos flask containing milk as system is shaken rapidly. Does the temperature of the milk rise?

(vii) Does entropy of a system increases or decreases due to friction? Explain.

(viii) Specific heat of gas at constant pressure is greater than specific heat at constant volume. Why?

(ix) Write down the two strokes of a petrol engine.

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

5. (a) Add two vectors by using their rectangular components. Determine the magnitude and direction of the resultant.

(b) A truck weighing 2500 Kg and moving with a velocity of 21 ms^{-1} collides with a stationary car weighing 1000 kg. The truck and the car move together after the impact. Calculate their common velocity

6. (a) Define gravitational field and conservative field. Prove that work done is independent of path followed in gravitational field by gravitational force.

(b) Calculate the angular momentum of a star of mass $2 \times 10^{30} Kg$ and radius $7 \times 10^5 Km$. If it completes one complete rotation about its axis once in 20 days.

7. (a) What is carnot engine? Discuss carnot cycle and calculate its efficiency.

(b) What gauge pressure is required in the city main for a stream from a fire hose connected to mains to reach a vertical height of 15 m.

8. (a) Describe Newton's formula for the speed of sound in air and explain how it was corrected by Laplace?

(b) A 100.0 g body hung on a spring elongates the spring by 4.0 cm. When a certain object is hung on the spring and set vibrating, its period is 0.568 second. What is the mass of the object pulling the spring?

9.(a) Describe diffraction of X-rays by crystals and derive Bragg's equation and what are the uses of X-rays diffraction

(b) Calculate the critical angle and angle of entry for an optical fibre having core of refractive index 1.50 and cladding of refractive index 1.48.

Q. 1

1) If the temperature of a gas is constant then $< \frac{1}{2} mv^2 >$ of the molecules of gas will be

(A) Constant (B) Zero (C) Increased (D) Decreased

2) For diatomic gas r = 1.4 and $C_v = \frac{5R}{2}$ (R is gas constant) then C_p will be

(A) $\frac{2}{5}R$ (B) $\frac{7}{2}R$ (C) $\frac{9}{2}R$ (D) $\frac{11}{2}R$

3) How many seconds are there in one year

(A) $3.156 \times 10^6 s$ (B) $3.1536 \times 10^8 s$ (C) $3.1536 \times 10^{10} s$ (D) $3.1536 \times 10^7 s$

4) Zero Error belongs to

(A) Personal Error (B) Random Error (C) Systematic Error (D) Collective Error

5) $\hat{i} \cdot (\hat{j} \times \hat{k})$ is equal to

(A) 1 (B) Zero (C) -1 (D) $\hat{i}$

6) Which is correct formula

(A) $\vec{\tau} = rF$ (B) $\vec{\tau} = rF \sin\theta$ (C) $\vec{\tau} = \vec{r} \times \vec{F}$ (D) $\vec{\tau} = rF \cos\theta \, \hat{n}$

7) A mass of 5000 gm moves with an acceleration of 10 mS^{-2}, force acting on it is

(A) 5 N (B) 500 N (C) 50 N (D) 5000 N

8) A body has P.E = mgh when it is at height "h" from the ground. At the point at a distance "x" below from the top its P.E. will be

(A) mgx (B) mgh (C) mg(x+h) (D) mg(h-x)

9) One degree is equal to

(A) $\frac{2\pi}{260} rad.$ (B) $\frac{2\pi}{180} rad.$ (C) $\frac{\pi}{180} rad.$ (D) $\frac{\pi}{360} rad.$

10) The Apparent weight of object of mass "m" when the lift is moving upward with acceleration equal to "g" (acceleration due to gravity) is given as

(A) mg (B) 2 mg (C) Zero (D) $\frac{1}{2} mg$

11) The dimensions of potential energy per unit volume are same as that of

(A) Work (B) Pressure (C) Speed (D) Density

12) The potential energy of a spring mass vibrating system at its mean position is

(A) Maximum (B) Minimum (C) Equal to K.E. (D) Zero

13) The speed of sound in air at $0 \, °C$ is $332 ms^{-1}$. Then speed of sound at $40 \, °C$ will be

(A) 372 ms^{-1} (B) 356.4 ms^{-1} (C) 346.4 ms^{-1} (D) 332 ms^{-1}

14) If a stretched string vibrate in three loops. Then relation between its length and wave length of stationary wave is

(A) $l = \frac{3\lambda}{2}$ (B) $l = 3\lambda$ (C) $l = \frac{2\lambda}{3}$ (D) $\lambda = 3l$

15) X-ray diffraction has been very useful in determining the structure of

(A) Haemoglobin (B) Stars (C) Galaxies (D) Stones

16) The angle between ray of light and wave front is

(A) $0°$ (B) $90°$ (C) $180°$ (D) $120°$

17) When an object is placed within the focal point of a convex lens then its image will be

(A) Real (B) Inverted (C) Virtual (D) Of same size

1118   Warning:- Please, do not write anything on this question paper except your Roll No.

Physics (Subjective)   **Group (II)**   (Session 2015-17 to 2017-19)   **Paper (I)**
Time Allowed: 2.40 hours   **Section ----------------- I**   (Inter Part - I) Maximum Marks: 68

2.   **Answer briefly any Eight parts from the followings:-**   **8 × 2 = 16**
(i)   The period of simple pendulum is measured by a stop watch. What type of errors are possible in the time period?
(ii)   The length and width of a rectangular plate are measured to be 15.3 cm and 12.80 cm respectively. Find the area of the Plate.
(iii)   Check the correctness of equation $E = mc^2$.   (iv) Define random error and systematic error.
(v)   Can a vector have a component greater than the Vector's magnitude.
(vi)   Name the two different conditions that could make $\vec{A}_1 \times \vec{A}_2 = 0$
(vii)   Can the magnitude of a vector have a negative value.
(viii)   How is distance calculated from Velocity-Time graph.   (ix) Differentiate between uniform and variable velocity.
(x)   Can the velocity of an object reverse direction when acceleration is constant? If so, give an example.
(xi)   Why fog droplets appear to be suspended in air?
(xii)   Define terminal velocity. Give its mathematical expression.

3.   **Answer briefly any Eight parts from the followings:-**   **8 × 2 = 16**
(i)   A girl drops a cup from a certain height, which breaks into pieces. What energy changes are involved?
(ii)   How energy is obtained from "biomass". (iii) Define Watt.
(iv)   Prove that $a = r\alpha$ (v) Show that orbital angular momentum $L = mvr$
(vi)   When mud flies off the tyre of a moving bicycle, in what direction does it fly?
(vii)   Define frequency. Give its units.
(viii)   Does frequency depends on amplitude of Harmonic Oscillator? Explain.
(ix)   Does the acceleration of a simple harmonic oscillator remain constant during its motion? Is the acceleration ever be zero?
(x)   Define Transverse Waves, give its two examples.
(xi)   What features do longitudinal waves have in common with transverse waves?
(xii)   Why does sound travel faster in solids than in gases?

4.   **Answer briefly any Six parts from the followings:-**   **6 × 2 = 12**
(i)   What do you mean by coherent sources? Explain a common method for producing two coherent sources.
(ii)   An oil film spreading over a wet footpath shows colours. Explain how does it happen?
(iii)   How would you manage to get more order of spectra using a diffraction grating?
(iv)   Why would it be advantageous to use the blue light with a compound microscope?
(v)   Describe with the help of diagram, have a convex lens can be used as magnifying glass?
(vi)   Write four postulates of Kinetic theory of gases.
(vii)   What is a refrigerator? Draw its block diagram. (viii) Write two statements of carnot's theorem.
(ix)   What is a tripple point cell? Also define thermodynamic scale.

Note: Attempt any three questions.   **Section ----------- II**   **(8 × 3 = 24)**
5. (a) State and Prove Law of Conservation of linear momentum.
      (b) Find the angle between the two vectors. $\vec{A} = 5\hat{i} + \hat{j}$ and $\vec{B} = 2\hat{i} + 4\hat{j}$
6. (a) Define centripetal acceleration, centripetal force and drive an expression for centripetal force.
      (b) How large a force is required to accelerate an electron of mass $9.1 \times 10^{-31} kg$ from rest to a speed of $2.0 \times 10^7 ms^{-1}$ through a distance of 5.0 cm.
7. (a) State Stoke's law. Prove that the terminal velocity of water droplet in falling through air is directly proportional to squar of its radius.
      (b) A mechanical engineer develops an engine, working between 327 °C and 27 °C. and claims to have an efficiency of 52 %. Does he Claim Correctly? Explain.
8. (a) What are Stationary Waves. Prove that frequencies of stationary waves are quantised in strings
      (b) A block of mass 4 Kg is dropped from a height of 0.8 m on to a spring of spring constant 1980 $N m^{-1}$. Find the maximum distance through which the spring will be compressed.
9. (a) What is Michelson's interferrometer? Explain its construction and working.
      (b) An astronomical telescope having magnifying power of 5 consists of two lenses 24 cm apart. Find focal length of the lenses.