Roll No. : _____

Objective

Paper Code

**6477**

**Intermediate Part First**

# PHYSICS ( Objective ) GROUP - I

Time: 20 Minutes Marks: 17

**Q.No.1** **You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill the relevant circle in front of that question number on computerized answer sheet. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero marks in that question. Attempt as many questions as given in objective type question paper and leave other circles blank.**

FSD-I-24

| S.# | Questions | A | B | C | D |
|---|---|---|---|---|---|
| 1 | The dimension of ρgh is similar as that of: | Power | Torque | Pressure | Force |
| 2 | The wavelength of wave produced by microwave oven is: | 6cm | 12cm | 24cm | 50cm |
| 3 | Speed of sound in air at S.T.P. is: | 280 m/s | 330 m/s | 332 m/s | 350 m/s |
| 4 | Half wavelength corresponds to: | 0° | 90° | 180° | 360° |
| 5 | Which cannot be polarized? | Sound waves | X-rays | Light waves | Radio waves |
| 6 | The first person who attempted to measure the speed of light was: | Newton | Galileo | Huygen | Michelson |
| 7 | Boltzman constant "K" has the same unit as: | Pressure | Energy | Temperature | Entropy |
| 8 | If temperature of the sink decreases, then efficiency of Carnot engine: | Increases | Decreases | Remains the same | First increases then decreases |
| 9 | Which is not a base unit in SI units? | Ampere | Joule | Kilogram | Kelvin |
| 10 | If error in measurement of radius of circle is 2%, then permissible error in its area will be: | 1% | 2% | 3% | 4% |
| 11 | If $A_x = A_y$, then angle between $\vec{A}$ and x-axis is: | 30° | 45° | 60° | 90° |
| 12 | In which quadrant vector $-2\hat{i} - 3\hat{j}$ lies? | 1st | 2nd | 3rd | 4th |
| 13 | Impulse has same unit as that of: | Mass | Energy | Force | Linear momentum |
| 14 | The range of projectile is same for: | 10°, 70° | 20°, 50° | 25°, 65° | 30°, 70° |
| 15 | Which one is non-renewable source of energy? | Tides | Biomass | Waves | Oil |
| 16 | Rotational K.E. of disc is given by: | $\frac{1}{2}mv^2$ | $\frac{1}{4}mv^2$ | $\sqrt{gh}$ | $\sqrt{\frac{4}{3}gh}$ |
| 17 | If a body of mass 10kg is falling freely, its apparent weight will be: | Zero | 10N | 98N | 980N |





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**Intermediate Part First** Roll No. _____

# PHYSICS ( Subjective ) GROUP - I

Time: 02:40 Hours Marks: 68 FSD-I-24

## SECTION – I

2. **Write short answers to any EIGHT parts.** 16

(i) Why do we find it useful to have two units for the amount of substance, the kilogram and the mole?
(ii) Does a dimensional analysis give any information on constant of proportionality that may appear in an algebraic expression? Explain.
(iii) Write the dimensions of (a) pressure (b) density.
(iv) If percentage uncertainty in radius of sphere is 0.4%, then what will be total uncertainty in its volume?
(v) Can a body rotate about its center of gravity under the action of its weight?
(vi) Name three conditions that could make, $\vec{A_1} \times \vec{A_2} = \vec{0}$
(vii) Draw the diagram of two cases in which components of a vector are equal in magnitude.
(viii) Explain the circumstances in which the velocity $\vec{v}$ and acceleration $\vec{a}$ of a car are (a) $\vec{v}$ is zero but $\vec{a}$ is not zero. (b) $\vec{a}$ is zero but $\vec{v}$ is not zero.
(ix) At what point or points in its path does a projectile have its minimum speed, its maximum speed?
(x) Which quantities are assumed to be constant in projectile motion?
(xi) What sort of energy is in (a) compressed spring (b) water in a high dam?
(xii) A girl drops a cup from a certain height, which breaks into pieces. What energy changes are involved?

3. **Write short answers to any EIGHT parts.** 16

(i) Explain how many minimum number of geostationary satellites are required for global coverage of TV transmission.
(ii) Satellites orbiting at different altitudes have different time periods. Explain why?
(iii) Why is it difficult for a car to turn round a corner at high speed than at lower speed?
(iv) A 1000kg car moves with a speed of $40ms^{-1}$ round a curve of radius 100m. Find the necessary centripetal force.
(v) Explain how the swing is produced in a fast moving cricket ball?
(vi) What are systolic and diastolic pressures? Also give values.
(vii) Under what conditions, does the addition of two simple harmonic motions produce a resultant, which is also simple harmonic?
(viii) What will be the frequency of a simple pendulum if its length is 1m at place where $g = 9.8ms^{-2}$ ?
(ix) Explain briefly the example of electrical resonance.
(x) How beats are useful in tuning musical instruments?
(xi) Differentiate between red shift and blue shift.
(xii) How the frequency of a string of a musical instrument can be changed?

4. **Write short answers to any SIX parts.** 12

(i) Can visible light produce interference fringes? Explain.
(ii) Why the polaroid sunglasses are better than ordinary sunglasses?
(iii) Differentiate between a ray and a wave front.
(iv) Why would it be advantageous to use blue light with a compound microscope?
(v) If a person was looking through a telescope at the full moon, how would the appearance of the moon be changed by covering half of the objective lens?
(vi) What are the necessary conditions for total internal reflection?
(vii) Why specific heat at constant pressure is greater than specific heat at constant volume?
(viii) Why does pressure of a gas in a car tyre increase when it is driven through some distance?
(ix) Explain adiabatic process with two examples.

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

5. (a) Define cross product of two vectors. Give examples. Also write the characteristics of cross product. 05
(b) A football is thrown upward with an angle of 30° with respect to horizontal. To throw a 40m pass, what must be initial speed of the ball? 03

6. (a) What is gravitational field? Show that work done in the earth gravitational filed is independent of the path followed. 05
(b) An organ pipe has a length of 50cm. Find the frequency of its fundamental note and the next harmonic when it is open at both ends. 03

7. (a) What is resonance phenomenon? Explain it with examples. 05
(b) A gramophone records turntable accelerates from rest to an angular velocity of 45.0 rev $min^{-1}$ in 1.60s. What is its average angular acceleration? 03

8. (a) What is Carnot cycle? Calculate the efficiency of a Carnot engine during one Carnot cycle. 05
(b) A water hose with an internal diameter of 20mm at the outlet discharges 30kg of water in 60 sec. Calculate the water speed at the outlet. Assume the density of water is $1000kgm^{-3}$ and its flow is steady. 03

9. (a) What do you know about diffraction grating? Also derive a relation which involves that image of each wavelength for a certain value of n is diffracted in a different direction. 01,03,01
(b) An astronomical telescope having magnifying power of 5 consists of two thin lenses 24cm apart. Find the focal lengths of the lenses. 03

Roll No. : _____

Objective

Paper Code

6474

FSD-2-24

Intermediate Part First

# PHYSICS ( Objective ) GROUP – II

Time: 20 Minutes Marks: 17

Q.No.1 **You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill the relevant circle in front of that question number on computerized answer sheet. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero marks in that question. Attempt as many questions as given in objective type question paper and leave other circles blank.**

| S.# | Questions | A | B | C | D |
|---|---|---|---|---|---|
| 1 | $C_p - C_v =$ : | Plank's constant | Molar gas constant | General gas constant | Boltzmann constant |
| 2 | Which remains constant in an adiabatic process: | Volume | Entropy | Pressure | Temperature |
| 3 | Least distance of distinct vision for normal eye is: | 15 cm | 125 cm | 25 cm | 25 m |
| 4 | Fringe spacing increases if we use: | Green light | Red light | Yellow light | Blue light |
| 5 | With increase of temperature sound speed: | Remains constant | Increases | Becomes zero | Decreases |
| 6 | Half wave length corresponds to: | 0° | 90° | 180° | 360° |
| 7 | The wave form of SHM is: | A square wave | Sine wave | Cosine wave | Tangent wave |
| 8 | SI units of viscosity are: | $kg^{-1} m s^{-1}$ | $kg^{-1} m^{-1} s$ | $kg m^{-1} s^{-1}$ | $kg m s^{-1}$ |
| 9 | Centripetal force performs: | Minimum work | Maximum work | No work | Negative work |
| 10 | Which quantity is dimension less? | Centripetal force | Angular velocity | Angular displacement | Angular acceleration |
| 11 | Which is non-conservative force? | Electrical force | Gravitational force | Frictional force | Magnetic force |
| 12 | SI unit of impulse is equivalent to that of: | Force | Velocity | Momentum | Acceleration |
| 13 | Which formula is true? | $m = \frac{a}{F}$ | $F = \frac{m}{a}$ | $a = \frac{F}{m}$ | $a = \frac{m}{F}$ |
| 14 | Magnitudes of cross product and dot product of two vectors are equal. The angle between the vectors is: | 0° | 45° | 180° | 60° |
| 15 | First condition of equilibrium implies that: | $\Sigma F = 0$ | $\Sigma F_x = 0$ | $\Sigma F_y = 0$ | $\Sigma F_x = \Sigma F_y$ |
| 16 | Significant figures in $8.70 \times 10^4$ kg are: | 5 | 4 | 3 | 2 |
| 17 | A light year is the distance light travels in one year. How many meters are there in one light year? | $9.5 \times 10^{-15}$ m | $9.5 \times 10^{15}$ km | $9.5 \times 10^{15}$ cm | $9.5 \times 10^{15}$ m |

Intermediate Part First Roll No. _____

# PHYSICS ( Subjective ) GROUP - II

Time: 02:40 Hours Marks: 68 FSD-2-24

## SECTION – I

2. **Write short answers to any EIGHT parts.** 16
   (i) Write the dimensions of pressure and density.
   (ii) Name several repetitive phenomenon occurring in nature which could serve as reasonable time standard.
   (iii) How many meters are there in one light year? Explain.
   (iv) What are the characteristics of ideal standard?
   (v) The vector sum of three vectors gives a zero resultant. What can be orientation of the vectors?
   (vi) Can a body rotate about its center of gravity under the action of its weight?
   (vii) If $\vec{A} = 3\hat{i} - 5\hat{j}$, $\vec{B} = 7\hat{k}$, find $(\vec{A} \times \vec{B})$
   (viii) Define impulse and show that how it is related to linear momentum?
   (ix) Explain the circumstances in which the velocity $\vec{v}$ and acceleration $\vec{a}$ of a car are perpendicular to one another.
   (x) What is the effect on the speed of a fighter plane chasing another when it opens the fire?
   (xi) When a rocket re-enters the atmosphere, its nose cone becomes very hot. Where does this heat energy come from?
   (xii) Prove that $P = \vec{F} \cdot \vec{v}$

3. **Write short answers to any EIGHT parts.** 16
   (i) What is the venturi relation? Which quantity is measured using this relation?
   (ii) How does swing is produced in a tennis ball?
   (iii) Two cylinders of equal mass but with different diameters, which has greater rotational inertia?
   (iv) What do you know about GPS and its use?
   (v) What is an orbital velocity? What does effect of mass of satellite on value of orbital velocity?
   (vi) How do you find direction of angular momentum and angular velocity in simple situation?
   (vii) Why does the oscillation of a vibrating body eventually stop?
   (viii) If a pendulum vibrates with frequency ' f '. What does effect on its angular frequency, if its time period is doubled?
   (ix) What does information is determined by phase of a vibrating body?
   (x) Describe the term crest, trough, node and antinode.
   (xi) How does the speed of distant stars and galaxies are calculated?
   (xii) In the phenomenon of stationary waves, if string vibrates in more and more loops, what would you conclude about its frequency and wavelength?

4. **Write short answers to any SIX parts.** 12
   (i) What conditions must be met to observe the interference of light?
   (ii) Why the polaroid sunglasses are better than ordinary sunglasses?
   (iii) Justify that a path difference $\frac{\lambda}{4}$ is neither associated with constructive interference nor destructive interference of light.
   (iv) How the power is lost in optical fiber through dispersion? Explain.
   (v) How the light propagates with in a flexible glass fiber?
   (vi) Describe briefly how light is refracted in continuous refraction?
   (vii) Can the mechanical energy be converted completely into heat energy? If so, give an example.
   (viii) Calculate the change in internal energy when 42J heat energy is transferred to the system during the expansion and 32J work is done on the piston.
   (ix) Does entropy of a system increase or decrease due to friction? Explain.

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

5. (a) What is meant by cross product and explain its four characteristics? 05
   (b) A 100g golf ball is moving to the right with a velocity of $20ms^{-1}$. It makes a head on collision with an 8 kg steel ball, initially at rest. Compute velocities of the balls after collision. 03
6. (a) Show that frequencies of stationary waves in a stretched string are quantized. 05
   (b) A car of mass 800kg travelling at $54kmh^{-1}$ is brought to rest in 60 meters. Find the average retarding force on the car. 03
7. (a) Define centripetal acceleration and derive its relation. 05
   (b) A 100g body hung on a spring elongates the spring by 4.0cm. When a certain object is hung on the spring and set vibrating, its period is 0.568s. What is the mass of the object pulling the spring? 03
8. (a) Derive the relations for pressure and temperature in term of average K.E. of the molecules. 05
   (b) What gauge pressure is required in the city mains for a stream from a fire house connected to the mains to reach a vertical height of 15.0m? 03
9. (a) What is meant by diffraction of light? Also discuss the diffraction of light through a narrow slit. 05
   (b) Calculate the critical angle and angle of entry for an optical fiber having core of refractive index 1.50 and cladding of refractive index 1.48. 03