Roll No. : _____

Objective
Paper Code
6471

Intermediate Part First
PHYSICS (Objective) **GROUP - I**
Time: 20 Minutes   Marks: 17

pakcity.org

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

www.pakcity.org

Intermediate Part First   Roll No. _____

PHYSICS (Subjective)   GROUP - I
Time: 02:40 Hours   Marks: 68

SECTION – I

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, $\overrightarrow{A_1} \times \overrightarrow{A_2} = \vec{0}$
(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 $\bar{v}$ and acceleration $\bar{a}$ of a car are (a) $\bar{v}$ is zero but $\bar{a}$ is not zero. (b) $\bar{a}$ is zero but $\bar{v}$ 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

6472

Intermediate Part First

PHYSICS (Objective) **GROUP – II**

Time: 20 Minutes   Marks: 17

pakcity.org

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

Intermediate Part First

Roll No. _____

PHYSICS (Subjective)   GROUP - II

Time: 02:40 Hours   Marks: 68

SECTION – I

rite short answers to any EIGHT parts. 16

) 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

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.acf

S.#	Questions	A	B	C	D
1	Centripetal force performs:	Positive work	No work	Negative work	Maximum work
2	Which one is correct?	1 torr = 13.33 Nm^{-2}	2 torr = 26.66 Nm^{-2}	5 torr = 65.65 Nm^{-2}	10 torr = 1333 Nm^{-2}
3	Which other quantity has the same unit as spring constant has Nm^{-1} ?	Torque	Momentum	Surface tension	Rotational K.E
4	If a wave is travelling in a rarer medium and incident on a denser medium then the phase change is:	360°	180°	90°	0°
5	When air column is closed from one end then the fundamental frequency becomes:	$1.0\left(\frac{v}{\ell}\right)$	$0.5\left(\frac{v}{\ell}\right)$	$0.75\left(\frac{v}{\ell}\right)$	$0.25\left(\frac{v}{\ell}\right)$
6	When fringe spacing in Young's double slit experiment is increased by increasing wavelength then number of fringes will be:	Decreased	Increased	Constant	Disappear
7	For incident angles equal to or greater than the critical angle, the glass-air boundary will act as:	Lens (Biconvex)	Mirror (Plane)	Lens (Concave)	Lens (Plano convex)
8	When the work is done at the cost of internal energy, then the equation becomes:	W = ΔU	W = Q	W = − ΔU	W = ΔV
9	Pick the correct condition for the relation $C_P - C_V = R$:	Internal energy is kept constant for both processes	Pressure is kept constant for both processes	Temperature is kept constant for both processes	Volume is kept constant for both processes
10	How many number of zeros in 7.4000 and 8000 kg are significant, if the later quantity has 1 kg least count?	None and none	Three and three	Three and two	Two and one
11	What choice would you have to pick for the percentage uncertainty in measuring 2.3cm with meter rod and 2.45cm with vernier calliper?	4.3% and 0.4%	4.0% and 0.1%	0.1% and 0.01%	3.9% and 0.52%
12	The distance of point P of position vector $\vec{r} = 3\hat{i} + 3\hat{j} + 3\hat{k}$ from the origin is:	3.0 unit	6.4 unit	5.2 unit	2.5 unit
13	Two vectors to be combined have magnitudes 60N and 35N with different directions. Pick the correct answer:	95 N	25 N	Both A & B	Can be any value between option A & B
14	What is the distance travelled by a body in the following velocity time graph?	100 m	20 m	10 m	5 m
15	Water flows out from a pipe at 3Kgs^{-1} and its velocity changes from 5ms^{-1} to zero on striking the ball, then force is:	10 N	15 N	20 N	25 N
16	Solar energy at normal incidence outside the Earth's atmosphere is:	1.0Wm^{-2}	1.4Wm^{-2}	1.0kWm^{-2}	1.4kWm^{-2}
17	For one radian, arc length 'S' and radius 'r' of circle has the relation:	S > r	r > S	S = r	S = 2r

SECTION – I

2. Write short answers to any EIGHT parts.   16

(i)   The period of simple pendulum is measured by a stop watch. What type of errors are possible in the time period?

(ii)   Write the dimensions of (a) pressure (b) density.

(iii)   Given that $V = (5.2 \pm 0.1)$ volt. Find its percentage uncertainty.

(iv)   What are supplementary units? Define only one unit.

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

(vi)   Suppose the sides of a closed polygon represent vector arranged head to tail rule. What is the sum of these vectors?

(vii)   Define the two conditions of equilibrium.

(viii) Explain the circumstances in which the velocity $\bar{v}$ and acceleration $\bar{a}$ of a car are (a) anti-parallel (b) $\bar{v}$ is zero but $\bar{a}$ is not zero.

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

(x)   What is isolated system? State the law of conservation of momentum.

(xi)   What is the effect on the speed of a fighter plane chasing another when it opens the fire?

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

3. Write short answers to any EIGHT parts.   16

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

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

(iii)   Define escape velocity. Write the formula to find escape velocity.

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

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

(vi)   Show that $S = r\theta$

(vii)   What is the total distance travelled by an object moving with simple harmonic motion in time equal to its period, if its amplitude is A?

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

(ix)   Draw the graph between amplitude and time in damped oscillations.

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

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

(xii)   Speed of sound in air at 0°C is 332ms⁻¹. Find its speed at 15°C.

4. Write short answers to any SIX parts.   12

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

(ii)   An oil film spreading over a wet footpath shows colours. Explain how does it happen?

(iii)   Find the grating element of the diffraction grating containing 2000 lines / cm.

(iv)   Explain briefly the single mode step index fiber.

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

(vi)   Give at least two postulates of kinetic theory of gases.

(vii)   Derive Boyle's law on the basis of kinetic theory of gases.

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

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

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

5. (a) What is a scalar product? Discuss its physical interpretation and write its three characteristics.   05

   (b) Ten bricks, each 6.0cm thick and mass 1.5kg lie flat on a table. How much work is required to stack them one on the top of another?   03

6. (a) State and explain law of conservation of linear momentum.   05

   (b) A gramophone record turntable accelerates from rest to an angular velocity of 45.0 rev min⁻¹ in 1.60s. What is its average angular acceleration?   03

7. (a) Define Stoke's law and show that the terminal velocity is directly proportional to square of radius of the water droplet.   05

   (b) A heat engine performs 100J of work and at the same time rejects 400J of heat energy to the cold reservoirs. What is the efficiency of the engine?   03

8. (a) Discuss the motion of a horizontal mass spring system and find the values of time period, instantaneous displacement and instantaneous velocity.   05

   (b) A pipe has a length of 1m. Determine the frequencies of the fundamental and the first two harmonics if the pipe is closed at one end.   03

9. (a) Explain diffraction of x-rays by crystals and derive Bragg's equation.   05

   (b) A simple astronomical telescope in its normal adjustment has an objective of focal length 100cm and an eye piece of focal length 5.0cm (i) where is the final image formed (ii) calculate the angular magnification.   03

Roll No. : _____

220 / 13

Objective
Paper Code
6478

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.acf

S.#	Questions	A	B	C	D
1	Einstein's theory of relativity inferred about the gravitational and inertial acceleration:	Are different to each other	Are precisely equivalent	Both are zero	Cannot be calculated
2	The relation between viscosity 'η' and temperature 't' can be:	$\eta \propto t$	$\eta \propto \frac{1}{t}$	There is no relation between them	All options (A,B,C) are possible
3	When 60N force elongates a spring by 30cm, what is the spring constant?	$600 \frac{N}{m}$	$300 \frac{N}{m}$	$200 \frac{N}{m}$	$100 \frac{N}{m}$
4	Out of phase points in a wave can have these series:	$0, \lambda, 2\lambda, 3\lambda, ...$	$\frac{\lambda}{2}, \frac{3\lambda}{2}, \frac{5\lambda}{2}, \frac{7\lambda}{2}, ...$	$0, \frac{\lambda}{2}, \lambda, \frac{3\lambda}{2}, 2\lambda, ...$	$0, 2\lambda, 4\lambda, 6\lambda, 8\lambda, ...$
5	What is the error in Newton's formula of speed of sound?	16% with temperature is taken as variable	16% with volume is taken as constant	16% with density is taken as constant	16% with temperature is taken as constant
6	For having more orders of spectra, the angle along the direction of normal to the grating is:	90°	45°	60°	0°
7	The real and inverted image cannot be made between:	F and 2F	Optical center and focus point	2F and infinity	F and infinity
8	When a thermodynamic system expands adiabatically the temperature of the system:	Constant	Increase	Decrease	First increase and then decrease
9	Pick the correct option for zero work done on / by a thermodynamic system:				
10	kg m^{2}s^{-3} and kg m^{-1}s^{-2} are the basic unit of these derived units:	Pascal and Watt	Watt and Pascal	Newton and Joule	Pascal and Coulomb
11	The addition of 5.32, 11.8, 2.189 and 0.089 is up to appropriate precision:	19.4	19.43	18.2	18.23
12	Find the value of X for two perpendicular vectors $\vec{A} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{B} = 4\hat{i} + \hat{j} + x\hat{k}$:	+4	+2	−5	−1
13	What is the analogous of force for rotational motion?	Angular displacement	Power	Angular momentum	Torque
14	The sum of θ_1 and θ_2 is equal to:	90°	45°	60°	70°
15	A stone is dropped from the top of the tower and it takes 3 seconds to reach ground. What is the height of tower? Take $g = 10 ms^{-2}$	10m	30m	45m	90m
16	What is the loss in work done when angle between force and displacement changes from 0° to 30°?	100%	50%	30%	14%
17	The radius of geo-stationary orbit from the center of the Earth is:	36000km	3.6×10^4 m	4.23×10^4 km	4.23×10^4 m

SECTION – I

Write short answers to any EIGHT parts.   16

(i) The length and width of a rectangular plate are measured to be 15.3cm and 12.80cm respectively. Find area of the plate.

(ii) How uncertainty is estimated in power factors?

(iii) When $V = 5.2 \pm 0.1V$ and $I = 0.84 \pm 0.05A$, what is percentage uncertainty in 'R'?

(iv) Can measurement taken with a Vernier caliper be more precise than a measurement taken with a screw gauge? Explain.

(v) Under what circumstances would a vector have rectangular component that are negative?

(vi) Show that vector addition is commutative.

(vii) What is torque? Write its units.

(viii) Two row boats moving parallel in the same direction are pulled towards each other. Explain.

(ix) Can the velocity of an object reverse the direction when acceleration is constant?

(x) State Newton's 2nd law in terms of momentum.

(xi) Draw the velocity-time graph for horizontal and vertical components of velocity of a projectile projected at certain angle with the horizontal.

(xii) A projectile is fired at 45° with the horizontal. Show that Range = 4 × vertical height.

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

(i) Prove that $1kWh = 3.6Mj$

(ii) An object has 1j of potential energy. Explain what does it mean?

(iii) What sort of energy is in (a) compressed spring (b) water in a high dam?

(iv) Show that $1 \text{ rad} = 57.3°$

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

(vi) State the direction of these vectors in simple situations. (a) Angular momentum (b) Angular velocity

(vii) For SHM of mass-spring system, prove that $P.E. = \frac{1}{2}kx_0^2$

(viii) In relation to SHM, explain the equations (a) $y = A\sin(\omega t + \varphi)$ (b) $a = -\omega^2 x$

(ix) What is meant by phase angle? Does it define angle between maximum displacement and the driving force?

(x) Define beats. Explain its one use.

(xi) Is it possible for two identical waves travelling in the same direction along a string to give rise to a stationary wave?

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

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

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

(ii) How would you distinguish between un-polarized and plane-polarized light.

(iii) What are Newton's rings?

(iv) A simple microscope has convex lens of focal length 100cm. Find its magnifying power.

(v) What is the difference between real and virtual image?

(vi) How the power is lost in optical fiber through dispersion? Explain.

(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) Draw PV diagram which show four steps of Carnot engine.

(ix) Why the entropy of the universe always increases?

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

5. (a) Define gravitational field. Show that work done in gravitational field is independent of the path followed and also show that work done in closed path is zero.   05

(b) Given that $\vec{A} = \hat{i} - 2\hat{j} + 3\hat{k}$ and $\vec{B} = 3\hat{i} - 4\hat{k}$ find the length of the projection of $\vec{A}$ on $\vec{B}$.   03

6. (a) Discuss the elastic collision in one dimension and prove that speed of approach is equal to the speed of separation.   05

(b) What is the least speed at which an aeroplane can execute a vertical loop of 1.0km radius so that there will be no tendency for the pilot to fall down at the highest point?   03

7. (a) What is a Carnot heat engine? Show that efficiency of a Carnot heat engine depends on the temperature of the hot and cold reservoirs.   05

(b) Water flows through a hose whose internal diameter is 1.0cm at a speed of $1.0ms^{-1}$. What should be the diameter of the nozzle if the water is to emerge at $21ms^{-1}$.   03

8. (a) Show that frequencies of stationary waves in a stretched string are quantized.   05

(b) A 100gm body hung on a spring elongates the spring by 4cm. 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

9. (a) Explain diffraction of x-rays by crystals. What are the uses of diffraction of x-rays?   05

(b) A telescope is made of an objective of focal length 20cm and an eye-piece of 5.0cm, both convex lenses. Find the angular magnification.   03

Faisalabad Board-2022

Intermediate Part First - 903

Objective
Paper Code
6477

PHYSICS (Objective) **GROUP - I**

Time: 20 Minutes   Marks: 17

Roll No. : _____

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.coi

S.#	Questions	A	B	C	D
1	Magnification of convex lens is:	$1+\frac{d}{f}$	$1-\frac{d}{f}$	$1+\frac{f}{d}$	$1-\frac{f}{d}$
2	According to Charles Law which relation is correct:	$v \propto T$	$v \propto \frac{1}{n}$	$p \propto \frac{1}{n}$	$p \propto \frac{1}{v}$
3	Which force is non-conservative?	Electric force	Magnetic force	Nuclear force	Gravitational force
4	Significant figures in 0.00567:	2	3	4	5
5	Pressure of gas is given as:	$\frac{2}{3}\rho <v^2>$	$\frac{1}{3}\rho <v^2>$	$\frac{3}{2}\rho <v^2>$	$\rho <v^2>$
6	The self cross product of vector $\bar{B}$ is:	Zero	1	A^2	AB
7	The distance covered by free falling in 4S is:	19.6m	39.2m	78.4m	4.9m
8	The angle 2π rad is equal to:	0°	180°	90°	360°
9	The angle $\theta = wt$ specify:	Critical angle	Solid angle	Phase angle	Plane angle
10	One giga is equal to:	10^9	10^6	10^{-7}	10^3
11	Magnitude of unit vector $\hat{i} \times \hat{j}$ is:	$\hat{k}$	−1	$-\hat{j}$	1
12	The value of 'g' at the center of earth is:	Infinite	2g	3g	Zero
13	Pull of the earth on 20kg body on surface of earth is:	20N	196N	19.6N	1960N
14	The unit of viscosity in S.I. is:	$Kg^{-1}ms^{-2}$	$Kgm^{-1}s^{-1}$	$Kg^{-1}m^{-2}s$	$Kgms^{-1}$
15	Energy stored in spring is:	Elastic P.E.	Gravitational P.E.	K.E.	Chemical P.E.
16	Sound travel faster in:	CO_2	H_2	O_2	He
17	The wavelength of x-ray is of the order:	10m	10^{-10}m	10^{-2}m	10cm

9-XI132029-40000

Faisalabad Board-2022

Intermediate Part First

Roll No. _____

PHYSICS (Subjective) **GROUP - I**

Time: 02:40 Hours   Marks: 68

SECTION – I

2. Write short answers to any EIGHT parts.   16

(i) Write the dimensions of (a) pressure (b) density.

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

(iii) Differentiate between random error and systematic error.

(iv) What are the uses of dimensions?

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

(vi) At what point or points in its path does a projectile have its minimum speed, its maximum speed?

(vii) A projectile is thrown from ground with velocity of 10m/sec at an angle of 30° with horizontal. Find the time taken to reach maximum height.

(viii) Why do you keep your legs far apart when you have to stand in the aisle of a bumpy riding bus?

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

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

(xi) A heat engine takes heat of 100J from source and rejects 20J heat to the sink. Find the percentage efficiency of heat engine.

(xii) Starting from the relation for pressure of the gas prove that $T = \frac{2}{3k} < \frac{1}{2} mv^2 >$

3. Write short answers to any EIGHT parts.   16

(i) Explain the multiplication of a vector by a scalar.

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

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

(iv) Define conservative field and give two examples.

(v) An object has 1J of potential energy. Explain what does it mean?

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

(vii) Why the objects in satellites appear to be weightless?

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

(ix) Show that the orbital angular momentum $L_0 = mvr$.

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

(xi) Why the polaroid sunglasses are better than ordinary sunglasses?

(xii) Explain the optical rotation of light.

4. Write short answers to any SIX parts.   12

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

(ii) What is meant by the phase angle? Does it define angle between maximum displacement and driving force?

(iii) Differentiate between forced and free oscillations?

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

(v) How can we find out unknown frequency of a turning fork by beats?

(vi) How can the speed of a car can be found by Doppler's effect?

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

(viii) Explain in brief the single mode step index fiber.

(ix) Differentiate between angular magnification and resolving power of an optical instrument.

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

5. (a) Define conservative field and show that earth's gravitational field is conservative.   05

(b) Show that three vectors $\hat{i}+\hat{j}+\hat{k}$, $2\hat{i}-3\hat{j}+\hat{k}$ and $4\hat{i}+\hat{j}-5\hat{k}$ are mutually perpendicular.   03

6. (a) Derive relations for rotational kinetic energy of a disc and a hoop. Calculate their velocities at the bottom of an incline of height h when both starts moving down at the same time.   05

(b) A truck weighing 2500kg and moving with a velocity of 21ms⁻¹ collides with stationary car weighing 1000kg. The truck and the car move together after the impact. Calculate their common velocity.   03

7. (a) Discuss effect of pressure, density and temperature on speed of sound. Also prove that $v_t = v_0 + 0.61t$ 05

(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 $21ms^{-1}$?   03

8. (a) How would you derive a relation for Bragg's equation. Also, compile the fact with at least two applications.   05

(b) A block weighing 4.0kg extends a spring by 0.16m from its unstretched position. The block is removed and a 0.50kg body is hung from the same spring. If the spring is now stretched and then released, what is its period of vibration.   03

9. (a) What is Carnot engine? Explain its working and calculate its efficiency.   05

(b) An astronomical telescope having magnifying power of 5 consists of two thin lenses 24cm apart. Find the focal lengths of the lenses.   03

9-XI122-40000

pakcity.org

Objective
Paper Code
6478

Intermediate Part First - 103
PHYSICS (Objective) **GROUP - II**
Time: 20 Minutes   Marks: 17

Roll No. : _____

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 given in objective type question paper and leave other circles blank.coa

S.#	Questions	A	B	C	D
1	Dimensions of angular velocity are:	$[LT^{-1}]$	$[T^{-1}]$	$[L^{-1}T^{-1}]$	$[MLT^{-1}]$
2	Bernoulli's equation gives the dimensions of:	Pressure	Energy	Flow rate	Velocity
3	If the initial phase is $\frac{\pi}{2}$ rad, the instantaneous displacement in SHM will be:	$X_0 \sin \omega t$	$X_0 \cos \omega t$	$-X_0 \sin \omega t$	Zero
4	Human ear can recognize beats having maximum frequency equal to:	40Hz	30Hz	5Hz	10Hz
5	If 10 waves occupy 15cm, what is the wavelength?	0.6m	6cm	1.5cm	15m
6	When a red light is replaced with blue light in Young's experiment, fringe spacing:	Increases	Decreases	Remains same	Becomes infinite
7	If the focal lengths of objective and eye-piece are doubled, the length of telescope becomes:	Double	Half	Three times	Four times
8	When ice melts, entropy _____.	Increases	Decreases	Remains unchanged	Becomes more negative
9	The relation $-W = +\Delta U$, represents the process:	Isothermal expansion	Adiabatic expansion	Isothermal expansion	Adiabatic compression
10	Which is a base quantity?	Area	Charge	Electric current	Force
11	A measurement of a needle diameter, $D = 4.5 \pm 0.01$ mm has percentage uncertainty:	45 %	0.4 %	0.5 %	0.2 %
12	$\|\hat{i} + \hat{j} + \hat{k}\|$ is equal to:	$3\sqrt{2}$	$2\sqrt{3}$	$\sqrt{3}$	1
13	For what angle between velocity and magnetic field, the force on a charge particle will be maximum?	90°	45°	0°	180°
14	The dragless ballistic trajectory for spherical earth should be:	Parabolic	Elliptical	Hyperbolic	spherical
15	Horizontal acceleration of projectile motion is:	G	g	$0ms^{-2}$	$12ms^{-2}$
16	With increasing attitude, the absolute gravitational potential energy of an object:	Increases	Decreases	Becomes more negative	Remains constant
17	For uniform circular motion, tangential acceleration equals:	Centripetal acceleration	Centrifugal acceleration	Angular acceleration	Zero

10-XI132021-17000

Faisalabad Board-2022

Intermediate Part First   Roll No. _____

PHYSICS   (Subjective)   GROUP - II

Time: 02:40 Hours   Marks: 68   pakcity.org

SECTION – I

2. Write short answers to any EIGHT parts.   16

(i) Write the dimensions of (a) pressure (b) density.

(ii) Write that the famous Einstein equation $E = mc^2$ is dimensionally constant.

(iii) Illustrate with an example, how uncertainty is calculated in addition of quantities?

(iv) What is systematic error? How can it be reduced?

(v) Define impulse and show how it is related to linear momentum.

(vi) At what point or points in its path does a projectile have its minimum speed, its maximum speed?

(vii) Why the kinetic energy is not conserved in inelastic collision?

(viii) What happens to the velocities of the body in an elastic collision when a light body collides with a massive body at rest?

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

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

(xi) Discuss in brief the power stroke for a petrol engine.

(xii) Differentiate between reversible and irreversible process.

3. Write short answers to any EIGHT parts.   16

(i) Define torque. Write its unit and dimensions.

(ii) The vector sum of three vectors give zero resultant. What can be the orientation of the vectors?

(iii) State the conditions of equilibrium.

(iv) State work energy principle.

(v) What is Salter's duck? How it is used to produce energy from waves?

(vi) A boy uses a catapult to throw a stone which accidentally smashes a green house window. List the possible energy changes.

(vii) State law of conservation of angular momentum. Write its one application.

(viii) Explain the difference between tangential velocity and angular velocity. If one of these is given for a wheel of known radius, how will you find the other?

(ix) What is "INTELSAT"? Write the capacity of "INTELSAT-VI".

(x) What is the difference between diffraction and polarization?

(xi) Define thin film. Give its two examples.

(xii) Could you obtain Newton's rings with transmitted light? If yes, would the pattern be different from that obtained with reflected light?

4. Write short answers to any SIX parts.   12

(i) Why fog droplets appear to be suspended in air?

(ii) Show that in SHM the acceleration is zero when velocity is greatest and the velocity is zero when the acceleration is the greatest.

(iii) Write the two characteristics of simple harmonic motion.

(iv) What is meant by damped oscillations?

(v) What are the factors common in transverse and longitudinal waves?

(vi) How beats are useful in turning musical instruments?

(vii) What is the frequency of fundamental note for an organ pipe of length 50cm, open at both ends? (speed of sound = 340m/s)

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

(ix) What is meant by total internal reflection? Explain by a ray diagram.

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

5. (a) Show that work done in earth's gravitational field is independent of the path followed.   05

(b) Find work done when the point of application of force $3\hat{i} + 2\hat{j}$ moves in straight line from the point $(2, -1)$ to the point $(6, 4)$.   03

(Continued P . . . . 2)

6. (a) What is the difference in real and apparent weight? Discuss the change in apparent weight with up and down accelerated motion. 05

(b) A truck weight 2500kg and moving with a velocity of $21ms^{-1}$ collides with a stationary car weighing 1000kg. The truck and the car move together after the impact. Calculate their common velocity. 03

7. (a) State and explain Torricelli's theorem. 05

(b) A church organ consists of pipes, each open at one end of different lengths. The minimum length is 30mm and longest is 4m. calculate the frequency range of the fundamental notes. (speed of sound = $340ms^{-1}$) 03

8. (a) Discuss the diffraction of light through diffraction grating and prove that $d\sin\theta = n\lambda$ 05

(b) A 100.0gm body hung on a spring elongates a 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

9. (a) Write the principle, construction and working of astronomical telescope. Also find its magnifying power. 05

(b) A reversible engine works between two temperatures whose difference is 100°C. If it absorbs 746J of heat from the source and rejects 546J to the sink, calculate the temperature of the source and the sink. 03

10-XI122-17000

Objective

Paper Code

6475

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.

S.#	Questions	A	B	C	D
1	The moment of inertia of a ring is equal to:	$\frac{1}{12}mr^2$	mr^2	$\frac{1}{2}mr^2$	$\frac{2}{5}mr^2$
2	1kWh = :	$3.6\mu J$	$3.6mJ$	$3.6kJ$	$3.6MJ$
3	The rate of change of momentum of a body equals to:	Work done	Applied power	Applied force	Impulse
4	The range of projectile is maximum when projectile is thrown at an angle of:	$30°$	$45°$	$60°$	$90°$
5	If $\overline{A} = 2\hat{i} - \hat{j} + 2\hat{k}$ then A = :	2	3	5	9
6	The area of the parallelogram formed with $\overline{A}$ and $\overline{B}$ as two adjacent sides is equal to:	$AB \sin\theta$	$AB \cos\theta$	$AB \tan\theta$	AB
7	The units of gravitational constant have units:	Nm^2kg^{-1}	$Nmkg^{-2}$	Nm^2kg^2	Nm^2kg^{-2}
8	Work have same dimensions as that of:	Momentum	Power	Torque	Impulse
9	Carnot engine consists of:	Two steps	Three steps	Four steps	Five steps
10	For adiabatic process, the first law of thermodynamics gives:	$Q = W$	$W = -\Delta U$	$Q = \Delta U$	$Q = \Delta U + W$
11	If N is the number of rulings on the grating, then the resolving power in the mth order diffraction is equal to:	$R = \frac{N}{m}$	$R = \frac{m}{N}$	$R = mN$	$R = \frac{1}{mN}$
12	The light from the Sun reaches the Earth with:	Circular wave fronts	Plane wave fronts	Spherical wave fronts	Elliptical wave fronts
13	The distance between a node and the next antinode is:	4λ	2λ	$\frac{\lambda}{4}$	$\frac{\lambda}{2}$
14	The increase in the speed of sound for one degree Celsius rise in temperature by:	$0.61cms^{-1}$	$0.61ms^{-1}$	$0.16cms^{-1}$	$0.16ms^{-1}$
15	If the length of a simple pendulum is doubled, its period:	Will not change	Will also be doubled	Will be halved	Will increase by 1.4 times
16	A chimney works best when it is:	Tall	Wide	Short	Narrow
17	The SI unit of angular displacement is:	Meter	Degree	Radian	Revolution

35-XI121-38000

Faisalabad Board-2021
Intermediate Part First

Roll No. _____

pakcity.org

PHYSICS (Subjective) GROUP - I
Time: 02:40 Hours   Marks: 68

SECTION – I

Write short answers to any EIGHT parts. 16

(i) Show that the expression $v_f = v_i + at$ is dimensionally correct, where v_i is the initial velocity at $t = 0$, " a " is the acceleration and v_f is the velocity at time " t ".

(ii) The wavelength λ of the wave depends on the speed v of the wave and frequency f. Decide which of the following is correct? $f = v\lambda$ or $f = \dfrac{v}{\lambda}$

(iii) Find the dimensions and hence the SI unit of coefficient of viscosity.

(iv) Does a dimensional analysis give any information on constant of proportionality that may appear in an algebraic expression? Explain.

(v) Define null vector. What is the difference between null vector and zero vector?

(vi) Write the position vector in one coordinate system, two coordinate system and three coordinate system.

(vii) If $\vec{A} = 2\hat{i} - 10\hat{j}$ and $\vec{B} = 6\hat{k}$. Find $\vec{A} \times \vec{B}$ (cross product).

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

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

(x) Describe a case when a massive body collide with light body at rest.

(xi) How the helmet safe from injury in accident?

(xii) Water flows out from a pipe at $3kgs^{-1}$ and its velocity changes from $5ms^{-1}$ to zero on striking the wall. Find the force exerted by the water.

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

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

(ii) When rocket re-enters the atmosphere, its nosecone becomes very hot. Where does this energy come from?

(iii) Define absolute potential energy. Give its unit.

(iv) Define angular momentum. What is its direction?

(v) Define angular velocity and angular acceleration.

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

(vii) Under what conditions does the addition of two simple hormonic motions produce a simple hormonic motion also?

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

(ix) Does the acceleration of simple hormonic oscillator remain constant? Is the acceleration zero anywhere?

(x) What is period of 250 cycles per second of sound waves?

(xi) Find the temperature at which the velocity of sound in air is two times its velocity at 0°C.

(xii) If velocity of sound is $332ms^{-1}$ at 0°C then what will be its velocity at 10°C?

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

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

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

(iii) State Huygen's principle.

(iv) 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?

(v) Why is the astronomical telescope preferred to use in normal adjustment?

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

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

(viii) State Carnot's theorem.

(ix) Differentiate between internal energy of a substance and internal energy of an ideal gas.

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

(a) Define scalar product of two vectors with examples. Write any four characteristics of scalar product. 01,04

(b) Two spherical balls of 2.0kg and 3.0kg masses are moving towards each other with velocities of 6.0 m/sec and 4 m/sec respectively. What must be the velocity of smaller ball after collision if velocity of bigger ball is 3.0 m/sec. 03

(a) Describe the stationary waves produced in a stretched string and prove that their frequencies are quantized. 05

(b) A 70kg man runs up a long flight of stairs in 4.0 s. The vertical height of the stairs is 4.5m. Calculate his power output in watts. 03

7. (a) Define laminar and turbulent flow and derive an expression for Bernoulli's equation.   05

   (b) A 1000kg car travelling with a speed of $144 kmh^{-1}$ rounds a curve of radius 100m. Find the necessary centripetal force.   03

8. (a) Define molar specific heats of a gas. Also show that $C_p - C_v = R$ 05

   (b) A block of mass 4kg is dropped from a height of 0.80m on to spring of spring constant $k = 1960 Nm^{-1}$. Find the maximum distance through which the spring will be compressed.   03

9. (a) What is compound microscope? Describe its construction and working. Also calculate its magnifying power.   05

   (b) Sodium light $(\lambda = 589 nm)$ is incident normally on a grating having 3000 lines per centimeter. What is the highest order of the spectrum obtained with this grating?   03

35-XI121-38000

Roll No. : _____

Objective
Paper Code
6476

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	If $\vec{A}\cdot\vec{B}=\left\vert\vec{A}\times\vec{B}\right\vert$ then angle between $\vec{A}$ and $\vec{B}$ is:	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	π
2	Dimensions of ratio of angular momentum to linear momentum is:	$[M^0LT^0]$	$[M^1L^1T^1]$	$[M^1L^2T^1]$	$[M^{-1}L^{-1}T^1]$
3	Dimensions of $\sqrt{F\frac{\ell}{m}}$ are:	$[M^0LT^{-1}]$	$[ML^{-1}T]$	$[ML^2T^{-3}]$	$[ML^{-1}T^{-1}]$
4	Magnifying power of telescope is:	$\frac{f_e}{f_o}$	$\frac{f_o}{f_e}$	$f_e f_o$	$\frac{1}{f_o f_e}$
5	In Michelson interferometer a fring is shifted each time the mirror is displaced through:	λ	$\frac{\lambda}{2}$	$\frac{\lambda}{4}$	Zero
6	If pendulum vibrate with frequency 0.5Hz, then its length will be:	10cm	50cm	80cm	99cm
7	Bernoulli's equation is based upon law of conservation of:	Momentum	Energy	Mass	Charge
8	If speed of moving body is doubled its K.E. is:	Doubled	Halved	Unchanged	4 times
9	SI unit of molar specific heat is:	J mol⁻¹K⁻¹	J mol K⁻¹	J mol K	J mol⁻¹
10	Highest efficiency of heat engine whose lower temperature is 17°C and higher temperature is 200°C is:	70%	100%	35%	38%
11	The stretched string of length 2m vibrates in 2 segments. The distance between two consecutive nodes is:	1m	2m	0.5m	4m
12	Tuning fork is source of:	Heat	Light	Sound	Electro-magnetic waves
13	Rotational kinetic energy of the hoop moving down on inclined plane is:	$\frac{1}{2}mv^2$	mv^2	$\frac{1}{4}mv^2$	$\frac{3}{4}mv^2$
14	Pull of the Earth on 20kg body on surface of Earth is:	20N	196N	19.6N	1960N
15	Rate of change of momentum is called:	Force	Pressure	Tension	Impulse
16	Mass of fuel consumed by a typical rocket to overcome earth's gravity is:	1000kg/s	100kg/s	10000kg/s	10kg/s
17	$\hat{i}\cdot\hat{i}=\hat{j}\cdot\hat{j}=\hat{k}\cdot\hat{k}$ is equal to:	0	1	– 1	2

36-XI121-35000

pakcity.org

SECTION – I

Write short answers to any EIGHT parts.   16

(i)   Show that formula $T = 2\pi\sqrt{\dfrac{\ell}{g}}$ is dimensionally correct.

(ii)   Add the following velocities given in m/s up to appropriate precision: 23.1 , 0.002 , 0.00023 , 5 – 12

(iii)   Define the terms (a) Precision (b) Dimensions of physical quantities.

(iv)   Write the dimensions of (a) Coefficient of viscosity η (b) Energy.

(v)   Define the terms (a) Resultant vector (b) Subtraction of vector.

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

(vii)   Suppose the sides of a closed polygon represent vector arranged head to tail. What is the sum of these vectors?

(viii) Define the terms (a) The time of flight (b) The range of projectile.

(ix)   What happened when light body collides with a massive body at rest?

(x)   Find the time of flight of projectile when it is thrown at an angle of 30° with horizontal.

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

(xii)   Explain what do you understand by rocket motion?

3. Write short answers to any EIGHT parts.   16

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

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

(iii)   Derive the mathematical expression for escape velocity.

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

(v)   What is meant by angular momentum? Also define law of conservation of angular momentum.

(vi)   Define angular acceleration. How angular and linear velocities are related? Explain.

(vii)   What should be the length of a simple pendulum whose period is 1 second at a place where $g = 9.8 ms^{-2}$.

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

(ix)   Describe two common phenomena in which resonance plays an important role.

(x)   Is it possible for two identical waves travelling in the same direction along a string to give rise to a stationary wave? Explain.

(xi)   Find the frequencies produced in organ pipe when it is open at both ends.

(xii)   What are beats? Also mention one use of beats.

4. Write short answers to any SIX parts.   12

(i)   In the Young's experiment, one of the slits is covered with blue filter and other with red filter. What would be the pattern of light intensity on the screen?

(ii)   Differentiate the interference and diffraction patterns of light.

(iii)   Write the conditions for detectable interference of light waves.

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

(v)   How convex lens act as a magnifying glass? Explain.

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

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

(viii) Define internal energy of a substance. Is it state function?

(ix)   How first law of thermodynamics explains human metabolism? Explain.

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

5. (a) State and prove law of conservation of linear momentum.   05

   (b) Two forces of magnitude 10N and 20N act on a body in directions making angle 30° and 60° with x-axis respectively. Find the resultant force.   03

6. (a) Explain the interconversion of potential energy and kinetic energy (i) When there is no frictional force (ii) When frictional force is present.   05

   (b) The frequency of the note emitted by a stretched string is 300Hz. What will be the frequency of the note when the length of the wave is reduced by one third without changing the tension?   03

7. (a) State and prove Torricelli's Theorem with diagram.   05

    (b) Calculate the angular momentum of a star of mass 2.0×10^{30} kg and radius 7.0×10^5 km, if it makes one complete rotation about its axis once in 20 days. What is its kinetic energy?   03

8. (a) Define simple pendulum. Show that its motion is SHM. Discuss its working derive relation for its time period.   05

    (b) Estimate average speed of nitrogen molecules in air under standard conditions of pressure and temperature. 03

9. (a) Explain the diffraction of X-rays by crystal and derive Bragg's law. What are the uses of diffraction of X-rays.   02,02,01

    (b) A simple astronomical telescope in normal adjustment has an objective of focal length 100cm and eye piece of focal length 5.0cm.

    (i) Where is the final image formed? (ii) Calculate the angular magnification.   03

36-XI121-35000

Faisalabad Board-2019

Objective
Paper Code
6477

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

☆ ☆
☆ ☆

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

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

35-XI119-25000

Faisalabad Board-2019

Intermediate Part First (New Scheme)   Roll No

PHYSICS   (Subjective)   GROUP - I

Time: 02:40 Hours   Marks: 68

pakcity.org

SECTION – I

2. Write short answers to any EIGHT parts.   16

(i)   Write the dimensions of pressure and density.

(ii)   Define radian and steradian.

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

(iv)   Suppose the sides of a closed polygon represent vectors arranged head to tail. What is the sum of these vectors?

(v)   Give two factors on which turning effect depends.

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

(vii) Define law of conservation of energy.

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

(ix)   Define venturi effect. Also write its relation.

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

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

(xii) Define periodic motion. Give example.

3. Write short answers to any EIGHT parts.   16

(i)   At what point or points in its path does a projectile have its minimum speed, its maximum speed?

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

(iii) The horizontal range of projectile is four times of its maximum height. What is angle of projection?

(iv)   Define ballistic flight and ballistic trajectory.

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

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

(vii) Differentiate between real weight and apparent weight.

(viii) How many radians are there in 2 degree?

(ix)   Explain the terms crest, trough node and anti-node.

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

(xi)   Why sound travel faster in hydrogen than in oxygen?

(xii) What do you mean by sonar technique? Explain it.

4. Write short answers to any SIX parts.   12

(i)   How would you distinguish between the unpolarized light and polarized light?

(ii)   An oil film spreading over a wet footpath shows colours. Explain how does it happen?

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

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

(v)   Differentiate between linear magnification and angular magnification.

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

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

(viii) Does the entropy of a system increase or decrease due to friction? Explain briefly.

(ix)   State first law of thermodynamics.

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

5. (a) Derive Boyle's law and Charle's law from the pressure of a gas equation.   05

   (b) Suppose, we are told that the acceleration of a particle moving in a circle of radius r with uniform velocity v is proportional to some power of r, say r^n, and some power of v, say v^m, determine the powers of r and v.   03

6. (a) Define vector product. Write any four characteristics of vector product.   05

   (b) A 100g golf ball is moving to the right with a speed of 20ms⁻¹. It makes a head on collision with an 8kg steel ball, initially at rest. Compute velocities of the balls after collision.   03

7. (a) Discuss the inter-conversion of potential and kinetic energy in absence of air friction. Also discuss the effect of air resistance.   05

   (b) A stationary wave is established in a string which is 120cm long and fixed at both ends. The string vibrates in four segments, at a frequency of 120Hz. Determine its wavelength and the fundamental frequency.   03

8. (a) What is simple pendulum? Show that motion of simple pendulum is simple harmonic. Also derive expression for its time period.   05

   (b) A gramophone record turntable accelerates from rest to an angular velocity of 45 rev. min⁻¹ in 1.60s. What is its average angular acceleration.   03

9. (a) What is simple microscope? Describe its construction, working and also derive the relation for its angular magnification.   05

   (b) A light of λ = 589nm is incident normally on grating having 3000 lines per centimeter. What is the highest order, the spectrum obtained with this grating?   03

Objective	**Intermediate Part First (New Scheme)**
Paper Code	**PHYSICS** (Objective) **GROUP - II**
6472	Time: 20 Minutes Marks: 17

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

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

36-XI119-24000

Intermediate Part First (New Scheme)   Roll No. _____

PHYSICS (Subjective)   **GROUP - II**

Time: 02:40 Hours   Marks: 68

pakcity.org

SECTION – I

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

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

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

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

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

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

7. (a) What are stationary waves? Discuss the stationary waves in air column with (i) both ends open (ii) one end open.   01,04
   (b) How large a force is required to accelerate an electron $(m=9.1 \times 10^{-31}kg)$ from rest to a speed of $2.0 \times 10^7 ms^{-1}$ through a distance of 5.0cm?   03

8. (a) Derive a relation for the frequency of a rotating spaceship to achieve the artificial gravity equal to earth's gravity.   05
   (b) A body of mass 4kg is dropped from a height of 50cm on to a spring of spring constant $k = 1960 N/m$. Find the maximum distance through which the spring will be compressed.   03

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

36-XII19-24000

Roll No. : _____

☆

Objective
Paper Code
6471

Intermediate Part First (New Scheme)
PHYSICS (Objective)
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	Which is the base quantity?	Charge	Area	Force	Electric current
2	Light year is the unit of:	Time	Light	Velocity	Distance
3	Magnitude of resultant of two forces 6N and 8N acting at right angle to each other is:	6N	10N	8N	Zero
4	If both components of a resultant vector are negative then resultant lies in:	1st quadrant	2nd quadrant	3rd quadrant	4th quadrant
5	Rate of change of momentum is equal to:	Impulse	Torque	Velocity	Force
6	If work done is negative then the angle between force and displacement is:	Zero	90°	45°	Greater than 90°
7	Time period of geostationary satellite of radius "R" is:	6 hours	12 hours	18 hours	1 day
8	If a body of mass 10kg is falling freely its apparent weight is:	Zero	98N	10N	980N
9	Pressure of fluid will be low where speed of fluid is:	Low	High	Zero	Constant
10	If amplitude of a simple pendulum is increased by four times its time period will be:	4 times	½ times	Same	2 times
11	Distance between two consecutive nodes is:	$\frac{\lambda}{2}$	$\frac{\lambda}{4}$	2λ	λ
12	Star moving away from earth shows:	Green shift	Blue shift	Red shift	Yellow shift
13	An oil film on water surface show colours due to:	Diffraction	Interference	Polarization	Dispersion
14	In sonar we use:	Sound waves	Ultrasonic waves	Radio waves	Microwaves
15	In normal adjustment the length of telescope is:	$\frac{f_o}{f_e}$	$\frac{f_e}{f_o}$	$1+\frac{d}{f_e}$	f_o+f_e
16	Value of triple point of water is:	Zero Kelvin	1K	100K	273.16K
17	Unit of entropy is:	JK	$\frac{J}{K}$	$\frac{K}{J}$	$J^{-1}K^{-1}$

PHYSICS   (Subjective)

Time: 02:40 Hours   Marks: 68

SECTION – I

2. Write short answers to any EIGHT parts.   **pakcity.org**   16
   (i)   How many seconds are there in one year?
   (ii)   Does a dimensional analysis give any information on constant of proportionality that may appear in algebraic expression? Explain.
   (iii) Give the drawbacks to use the period of a pendulum as a time standard.
   (iv)   Define radian and steradian.
   (v)   A vector $\vec{A}$ lies in the XY-plane. For what orientation will both of its rectangular components be negative? For what orientation will its components have opposite signs?
   (vi)   Can a body rotate about its center of gravity under the action of its weight?
   (vii) Define torque. Write its unit.
   (viii) An object is thrown vertically upward. Discuss the sign of acceleration due to gravity, relative to velocity, while the object is in air.
   (ix)   At what points in its path does a projectile have its minimum speed, its maximum speed?
   (x)   Define ballistic missile and ballistic trajectory.
   (xi)   A person is standing near a fast moving train. Is there any danger that he will fall towards it?
   (xii) What do you mean by laminar flow and turbulent flow?

3. Write short answers to any EIGHT parts.   16
   (i)   In what situation work done by a force on a body is positive, negative and zero?
   (ii)   What is solar constant and what is its value?
   (iii) An object has one Joule of potential energy. Explain what does it mean?
   (iv)   Why does a diver change his body positions before and after diving in the pool?
   (v)   What is the critical velocity? Find its value.
   (vi)   What is the main difference between Newton's and Einstein's views about gravitation?
   (vii) Can we realize an ideal simple pendulum? Explain.
   (viii) How resonance play role in tuning radio?
   (ix)   The amplitude of simple pendulum should be small, why? Explain.
   (x)   What are beats and name its one use?
   (xi)   How can doppler effect be used to monitor blood flow through major arteries?
   (xii) Why does sound travel faster in solids than in gases?

4. Write short answers to any SIX parts.   12
   (i)   Why the polaroid sunglasses are better than ordinary sunglasses?
   (ii)   Under what conditions two or more sources of light behave as coherent sources?
   (iii) What is Huygen's principle?
   (iv)   Why would it be advantageous to use blue light with a compound microscope?
   (v)   How light signal is transmitted through the optical fiber?
   (vi)   Is it possible to convert the internal energy into mechanical energy? Give an example.
   (vii) Define thermodynamic scale of temperature.
   (viii) State second law of thermodynamics in terms of entropy.
   (ix)   Specific heat of a gas at constant pressure is greater than specific heat at constant volume. Why?

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

5. (a) Define vector product. Give four characteristics of the vector product.   05
   (b) A truck weighing 2500Kg and moving with a velocity of $21 ms^{-1}$ collides with stationary car weighing 1000Kg. The truck and the car move together after the impact. Calculate their common velocity.   03

6. (a) Define rotational kinetic energy. Derive expression for rotational kinetic energy of a disc and a hoop.   05
   (b) A car of mass 800Kg travelling at the speed of $54 kmh^{-1}$ is brought to rest in 60 meters. Find the average retarding force on the car. What has happened to original kinetic energy?   03

7. (a) Define the terminal velocity. Show that terminal velocity is directly proportional to the square of radius.   05
   (b) A Carnot engine whose low temperature reservoir at 7°C has an efficiency of 50%. It is desired to increase the efficiency to 70%. By how much degrees the temperature of source be increased?   03

8. (a) Define stationary waves and show that the stationary waves in a stretched string are harmonic series.   05
   (b) A block of mass 4.0Kg is dropped from a height of 0.80m on to a spring of spring constant $1960 Nm^{-1}$. Find the maximum distance through which the spring will be compressed?   03

9. (a) What is spectrometer? Discuss its different parts. Write its uses.   05
   (b) In double slit experiment, the second order maximum occurs at $\theta = 0.25°$. The wavelength is 650nm. Determine the slit separation.   03

34-XI118-48000