13

Version No.				
3	0	0	4	3

ROLL NUMBER					

PHYSICS HSSC–I

SECTION – A (Marks 17)

Time allowed: 25 Minutes

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed.

Do not use lead pencil.

حصہ اول لازمی ہے۔ اس کے جوابات اسی صفحہ پر دے کر ناظم مرکز کے حوالے کریں۔ کاٹ کر دوبارہ لکھنے کی اجازت نہیں ہے۔ لیڈ پنسل کا استعمال ممنوع ہے۔

Answer Sheet No. _____

ہر سوال کے سامنے دیے گئے، کریکولم کے مطابق درست دائرہ کو پر کریں۔ **Invigilator Sign.** _____

Fill the relevant bubble against each question according to curriculum: **Candidate Sign.** _____

	Question	A	B	C	D	A	B	C	D
1.	Optically active crystal rotates the:	Diffraction plane	Interference plane	Vibrating plane	Polarization plane	○	○	○	○
2.	For an ideal gas the internal energy is directly proportional to:	Mass	Temperature	Pressure	Volume	○	○	○	○
3.	Solid angle subtended at the center of sphere of radius (r) is equal to:	3.14 Sr	57.3 Sr	12.57 Sr	6.28 Sr	○	○	○	○
4.	If the magnitude of $\overline{A}.\overline{B} = \frac{1}{2}AB$ then angle between $\overline{A}$ and $\overline{B}$ is:	60°	90°	30°	45°	○	○	○	○
5.	Which one remains constant for a satellite in orbit?	Angular momentum	Potential energy	Velocity	Kinetic energy	○	○	○	○
6.	Angle of projection, for which range of a projectile becomes half of its maximum range is equal to:	45°	60°	30°	15°	○	○	○	○
7.	The slope of velocity-time graph at any instant represents:	Power	Force	Instantaneous velocity	Instantaneous acceleration	○	○	○	○
8.	If the body of mass 2 kg is raised vertically through 3m, then work done will be:	58.8 J	50 J	6 J	50.8 J	○	○	○	○
9.	Which one of the following is **non-renewable** source of energy?	Coal	Sunlight	Wind	Biomass	○	○	○	○
10.	If $A_x = -2$, $A_y = -2$ then resultant vector will make angle:	180°	225°	45°	90°	○	○	○	○
11.	Which of the following devices is used to measure speed of liquid flow?	Barometer	Venturimeter	Spectrometer	Speedometer	○	○	○	○
12.	Mass spring system is pulled slowly from mean position to (x_o) then the amount of work done will be:	Kx_o	Kx_o^2	$\frac{1}{2}Kx_o$	$\frac{1}{2}Kx_o^2$	○	○	○	○
13.	Tuning of radio is the best example of:	Musical resonance	Magnetic resonance	Mechanical resonance	Electrical resonance	○	○	○	○
14.	If 332 waves pass through a medium in one second with speed of 332 m/s then wave length will be:	664m	1m	7m	332m	○	○	○	○
15.	If pressure of air is increased two times then speed of sound in air will:	Remain constant	Be 04 times	Be 16 times	Become double	○	○	○	○
16.	Length of pipe is 10cm (closed at one end) then maximum wave length will be:	20cm	40cm	5cm	10cm	○	○	○	○
17.	Maxima is produced at points where the path difference between two monochromatic waves is:	$\lambda/4$	$3\lambda/2$	λ	$\lambda/2$	○	○	○	○

- $P.E = mgh$
- $Area\ of\ sphere = 4\pi r^2$
- $\overline{A}.\overline{B} = AB\cos\theta$
- $v = f\lambda$
- $\lambda = 4L$
- $g = 9.8ms^{-2}$
- $f = \frac{1}{T}$
- $\theta = \tan^{-1}\left(\frac{F_y}{F_x}\right)$
- $R = \frac{v_i^2 \sin 2\theta}{g}$
- $Number\ of\ steradian\ in\ sphere = \frac{Area\ of\ sphere}{r^2}$

III

PHYSICS HSSC–I

Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

SECTION – B (Marks 42)

Q. 2 Answers the following questions briefly. **(14 x 3 = 42)**

(Use of graph paper is not necessary. Candidates can make their own grid on answer book if required)

(i)	Under what conditions two or more sources of light behave as coherent sources?	03	OR	Why flash of lightning is seen earlier than the thunder? Explain briefly.	03
(ii)	Differentiate between precision and accuracy.	03	OR	Show that: $\left\|\vec{A}\times\vec{B}\right\|^2+\left\|\vec{A}.\vec{B}\right\|^2=A^2B^2$	03
(iii)	Under what circumstances would a vector has components that are equal in magnitude? Explain graphically.	2+1	OR	Describe the limitations of dimensional analysis.	03
(iv)	For a projectile show that: $R=R_{max}\,\mathrm{Sin}\,2\theta$	03	OR	Differentiate between conservative and non-conservative forces.	03
(v)	Show that the given equation is dimensionally consistent: $2as=v_f^2-v_i^2$	03	OR	A machine needs $500J$ of energy to raise $5\ kg$ block at distance of $3.0m$ .Find the efficiency of machine.	03
(vi)	Differentiate between radian and steradians. Show that number of steradians in sphere are equal to $4\pi\ Sr$.	2+1	OR	Describe angular displacement, and angular acceleration. Express angular displacement in radian.	03
(vii)	Briefly explain the equation $\tan\theta=\frac{v^2}{rg}$, relating banking angle 'θ' to speed 'v' and radius of curvature 'r'.	03	OR	Why fog droplets appear to be suspend in air? Explain briefly.	03
(viii)	What is the moment of inertia of a $50kg$ sphere whose radius is $25cm$?	03	OR	A certain pipe has a cross-sectional area of $0.0002m^2$ in which water is flowing at $5m/s$. Find flow rate.	03
(ix)	Why is there weightlessness in artificial satellite? Explain briefly.	03	OR	In a ripple tank 20 waves passes through a certain point in one second. If the wave length of wave is $4cm$ then find the speed of wave.	03
(x)	How the amplitude of a forced oscillation changes with frequency near to the natural frequency of the systems. Describe graphically.	03	OR	How the variation of pressure affects speed of sound in air? Explain briefly.	03
(xi)	Briefly explain Brewster's law of polarization.	03	OR	Calculate work done by a thermodynamic system during volume change.	03
(xii)	Why do the systems tend to become less orderly over time? Explain briefly.	03	OR	Briefly explain diffraction of x-rays through crystals.	03
(xiii)	How are colour patterns formed in interference of light through thin films? Explain briefly.	03	OR	Determine the two complementary angles at which the horizontal ranges of two projectiles become equal when velocity of projections and the acceleration due to gravity are kept constant.	03
(xiv)	Briefly explain adiabatic process by using first law of thermodynamics.	03	OR	What is meant by impulse? How it can be related to momentum of body? Explain briefly.	1+2

SECTION – C (Marks 26)

Attempt the following questions.

(Use of graph paper is not necessary. Candidates can make their own grid on answer book if required)

Q.3	Explain addition of number of vectors (N-vectors) by using rectangular components method. Illustrate with diagram.	3+4	OR	What is meant by projectile motion? Explain in detail. Derive expressions for height of projectile and time of flight of projectile.	3+4
Q.4	Describe Bernoulli's equation for ideal fluid flow.	06	OR	Explain energy conservation in SHM.	06
Q.5	Show that the work done in gravitational field is independent of path followed.	07	OR	What is meant by orbital velocity? Derive relationship between orbital velocity, the gravitational constant, mass and radius of orbit.	2+5
Q.6	Explain Doppler effect on the basis of principle of superposition.	06	OR	Show that: $C_p-C_v=R$	06

- $\vec{A}.\vec{B}=AB\cos\theta$
- $P.E=mgh$
- $\vec{A}\times\vec{B}=AB\sin\theta\,\hat{n}$
- $efficiency=\frac{output}{input}\times100$
- $f=\frac{1}{T}$
- $\frac{\Delta V}{\Delta t}=Av$
- $R=\frac{v_i^2\sin2\theta}{g}$
- $Number\ of\ steradian\ in\ sphere=\frac{Area\ of\ sphere}{r^2}$
- $I_{Sphere}=\frac{2}{5}MR^2$
- $v=f\lambda$

15

Version No.				
3	2	0	4	2

ROLL NUMBER					

PHYSICS HSSC–I

SECTION – A (Marks 17)

Time allowed: 25 Minutes

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Do not use lead pencil.

حصہ اول لازمی ہے۔اس کے جوابات اسی صفحہ پر دے کر ناظم مرکز کے حوالے کریں۔کاٹ کر دوبارہ لکھنے کی اجازت نہیں ہے۔لیڈ پنسل کا استعمال ممنوع ہے۔

Answer Sheet No. _____

ہر سوال کے سامنے دیے گئے، کریکولم کے مطابق درست دائرہ کو پر کریں۔ **Invigilator Sign.** _____

Fill the relevant bubble against each question according to curriculum: **Candidate Sign.** _____

	Question	A	B	C	D	A	B	C	D
1.	An isothermal process is represented by:	Boyle's law	Charles' law	Gay-Lussac law	Ideal gas law	○	○	○	○
2.	If the body is at rest or moving with uniform angular momentum, then torque will be:	Positive	Maximum	Minimum	Zero	○	○	○	○
3.	A ball with original momentum $5.0kg\,m/s$ hits a wall and bounces straight back without losing any kinetic energy the change in momentum of ball is:	$-10NS$	$5NS$	$-5NS$	$10NS$	○	○	○	○
4.	In a cricket match 600 spectators are counted one by one. How many significant figures will be there in final result?	0	1	2	3	○	○	○	○
5.	Area under velocity-time graph gives:	Momentum	Speed	Acceleration	Distance	○	○	○	○
6.	The magnitude of vector $\vec{B}=-2\hat{i}+\hat{j}-2\hat{k}$ is equal to:	1	9	5	3	○	○	○	○
7.	Kilo-watt hour is unit of:	Force	Energy	Power	Pressure	○	○	○	○
8.	Escape velocity of a mass 500 kg is11km/s, if the mass of body is doubled then the escape velocity will be:	$44km/s$	$5.5km/s$	$11km/s$	$22km/s$	○	○	○	○
9.	Moment of inertia of disc is:	$\frac{2}{5}mr^2$	mr^2	$\frac{1}{2}mr^2$	$\frac{3}{2}mr^2$	○	○	○	○
10.	The net force that acts on 20N falling object, when it encounters 6N of air resistance is:	20N	0N	6N	14N	○	○	○	○
11.	When length of pendulum is doubled, ratio of new frequency to old frequency will be:	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{\sqrt{2}}$	$\sqrt{2}$	○	○	○	○
12.	The process by which the energy is dissipated in an oscillating system is called:	Harmonic oscillation	Resonance	Damping	Forced oscillation	○	○	○	○
13.	Path-difference for constructive interference is:	$m\lambda$	$\lambda/2$	$5\lambda/2$	$3\lambda/2$	○	○	○	○
14.	Stars moving towards earth show a:	Yellow shift	Red shift	Blue shift	White shift	○	○	○	○
15.	What length of open pipe will produce a frequency of 1200 Hz as its first harmonic on a day when speed of sound is $340ms^{-1}$?	$14.17m$	$28.3cm$	$28.3m$	$14.17cm$	○	○	○	○
16.	Which one of the following waves **CANNOT** be polarized?	Visible light	Radio-wave	X-rays	Sound waves	○	○	○	○
17.	Light from sun reaches the earth in the form of:	Hyperbolic wave front	Spherical wave front	Plane wave front	Elliptical wave front	○	○	○	○

$T=2\pi\sqrt{\frac{l}{g}}$ $\quad \lambda=2L$ $\quad v=f\lambda$ $\quad v_{esc}=\sqrt{2g\mathrm{R_e}}$ $\quad P=mv$ $\quad K.E=\frac{1}{2}mv^2$ $\quad P=\frac{W}{t}$ $\quad \Delta P=P_f-P_i$ $\quad |A|=\sqrt{A_x^2+A_y^2+A_z^2}$

II

PHYSICS HSSC–I

Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

SECTION – B (Marks 42)

Q. 2 Answers the following questions briefly. **(14 x 3 = 42)**

(Use of graph paper is not necessary. Candidates can make their own grid on answer book if required)

(i)	Briefly explain the main principle behind the use of ultrasound to obtain diagnostic information about internal structure.	03	OR	Why does a cricket player retract his hand while catching the ball? (Describe in context of impulse)	03
(ii)	If $(\vec{A}+\vec{B})$ and $(\vec{A}-\vec{B})$ are perpendicular to each other, then show that $\vec{A}$ and $\vec{B}$ are of the same magnitude.	03	OR	Two wave pulses travelling in opposite direction completely cancel each other. What happens to energy possessed by waves? Briefly explain.	03
(iii)	How artificial gravity is created to counter balance weightlessness? Describe briefly.	03	OR	Show that following equations are homogeneous with respect to dimensions: (i) $a_c = \frac{v^2}{r}$ (ii) $E = mc^2$	03
(iv)	Why kinetic energy of system does not remain constant in inelastic collision? Explain briefly.	03	OR	Show that $S = v_i t + \frac{1}{2}at^2$ is dimensionally consistent.	03
(v)	Differentiate between radian and steradian. Show that number of steradians in sphere are equal to $4\pi Sr$.	2+1	OR	State the conditions of equilibrium with mathematical expressions.	03
(vi)	Show that the angles of projection, that exceed or fall short of $45°$ by equal amount, ranges are equal.	03	OR	Work done can be calculated from the area under force-displacement graph. Illustrate your answer.	03
(vii)	Differentiate between renewable and non-renewable energy sources.	03	OR	What is meant by moment of inertia of body and angular momentum?	03
(viii)	Differentiate between absolute uncertainty and percentage uncertainty with examples.	03	OR	Is there any work done by centripetal force? Elaborate your answer.	03
(ix)	An electric motor turns at 200rpm. What is the angular velocity? What is angular displacement after 5sec?	03	OR	Why clouds appear to float in air? Explain briefly.	03
(x)	A small circular hole $4.00mm$ in diameter is cut in the side of a large water tank, $12m$ below the water level in the tank. The top of tank is open to the air. Find speed of efflux of water and the volume discharged per second.	03	OR	Briefly explain any two applications of resonance.	03
(xi)	How ultrasonic waves can be detected by using piezoelectric method? Briefly explain.	03	OR	Discuss necessary conditions for detectable interference of light.	03
(xii)	Explain briefly the function of moveable plane mirror used in Michelson's interferometer.	03	OR	How is energy degraded in all natural processes? Explain briefly.	03
(xiii)	Why molar specific heat at constant pressure is greater than molar specific heat at constant volume? Give reason.	03	OR	When Young's double slit experiment apparatus is taken from air into water, what will happens to the interference pattern?	03
(xiv)	Write two statements of second law of thermodynamics.	03	OR	How can the fringe width be increased in Young's double slit experiment? Briefly explain.	03

SECTION – C (Marks 26)

Attempt the following questions.

(Use of graph paper is not necessary. Candidates can make their own grid on answer book if required)

Q.3	What is meant by vector product of two vectors? Explain. Also write down the characteristics of vector product.	07	OR	Explain elastic collision in one-dimension. Show that velocity of approach is equal to velocity of separation.	2+5
Q.4	Describe Bernoulli's equation for ideal fluid flow.	06	OR	Show that motion of simple pendulum is simple harmonic motion.	06
Q.5	What is meant by absolute potential energy? Derive an expression for absolute potential energy.	2+5	OR	Derive relation between centripetal force and centripetal acceleration. Show that $a_c = \frac{v^2}{r}$.	4+3
Q.6	How speed of sound in air varies with temperature? Show that $V_t = V_0 + 0.61t°C$.	3+3	OR	Explain the working principle of Carnot's engine.	06

$F_c = \frac{mv^2}{r}$ $S = r\theta$ $\omega = \frac{\Delta\theta}{\Delta t}$ $\frac{\Delta V}{\Delta t} = Av$ $v = f\lambda$ $f = \frac{1}{T}$

$R = \frac{v_i^2 \sin 2\theta}{g}$ $v = \sqrt{2gh}$ $H = \frac{Vi^2 \sin^2\theta}{2g}$ $I_{Sphere} = \frac{2}{5}MR^2$ $Number\ of\ steradian\ in\ spere = \frac{Area\ of\ sphere}{r^2}$