13

Version No.			
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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 اوّل لازمی ہے۔ اس کے جوابات اسی صفحہ پر دے کر نگران کے حوالے کریں۔ کاٹ کر دوبارہ لکھنے کی اجازت نہیں ہے۔ لیڈ پنسل کا استعمال منع ہے۔

Answer Sheet No. _____

ہر سوال کے سامنے دیے گئے، کریکولم کے مطابق درست دائرہ کو پُر 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.	Which of the following has higher efficiency? An engine working between the temperatures:	80K and 60K	100K and 80K	40K and 20K	60K and 40K	○	○	○	○
2.	In which of the following processes temperature remains constant?	Adiabatic	Isothermal	Isobaric	Isochoric	○	○	○	○
3.	The density of a steel ball was determined by measuring its mass and diameter. The mass was measured with 1% and diameter with 3% uncertainly. The percentage error in the density of steel ball is approximately:	10%	28%	2%	4%	○	○	○	○
4.	Torque $\vec{\tau}$ is defined as the vector product of position vector $\vec{r}$ (moment arm) and force $\vec{F}$. What will be the scalar product of torque $\vec{\tau}$ and position vector $\vec{r}$ (Moment arm)?	$\vec{\tau}.\vec{r}\tan\theta$	Zero	$\vec{\tau}.\vec{r}\sin\theta$	$\vec{\tau}.\vec{r}\cos\theta$	○	○	○	○
5.	Which one of the following is unit vector of a vector $\vec{A}=4\hat{i}-2\hat{j}$	$\frac{4}{\sqrt{20}}\hat{i}-\frac{2}{\sqrt{20}}\hat{j}$	$\frac{4}{\sqrt{3}}\hat{i}-\frac{2}{\sqrt{3}}j$	$\frac{4}{13}\hat{i}-\frac{2}{13}\hat{j}$	$\frac{4}{2\sqrt{3}}\hat{i}-\frac{2}{2\sqrt{3}}\hat{j}$	○	○	○	○
6.	A projectile is thrown so that it travels a maximum range of 1000m ($\theta=45°$). How high will it rise?	400m	4000m	500m	250m	○	○	○	○
7.	When velocity time graph is a straight line parallel to time axis then:	Acceleration is zero	Velocity is zero	Acceleration is negative	Acceleration is variable	○	○	○	○
8.	The gravity does no work, when the body moves:	Horizontally	At an angle of 45°	Vertically downward	Vertically upward	○	○	○	○
9.	If momentum of a body is doubled. Its kinetic energy:	Becomes half	Remains constant	Becomes double	Becomes quadruple	○	○	○	○
10.	Minute hand of a clock is 2m long. What will be its angular speed?	$1.256\times10^{2}\,rads^{-1}$	$6.28\,rads^{-1}$	$1.7\times10^{-3}\,rads^{-1}$	$1.04\times10^{-1}\,rads^{-1}$	○	○	○	○

III

	Question	A	B	C	D	A	B	C	D
11.	Linear speed of a point on a wheel increases as we move from center to rim of wheel. The angular speed of that point:	Remains same	Is equal to linear speed	Also increases	Also decreases	○	○	○	○
12.	The S.I unit of viscosity is:	$kgms^{-1}$	$kgm^{-1}s$	$kgm^{-1}s^{-2}$	$kgm^{-1}s^{-1}$	○	○	○	○
13.	A simple harmonic oscillator has amplitude x_0 and time period T. Its maximum speed at mean position is:	$\frac{4\pi x_0}{T}$	$\frac{2T}{x_0}$	$\frac{2x_0}{T}$	$\frac{2\pi x_0}{T}$	○	○	○	○
14.	A simple pendulum suspended from the ceiling of a lift has time period T, when the lift is at rest . If the lift falls freely, the time period becomes:	Zero	$\sqrt{2}T$	Infinite	$\frac{T}{\sqrt{g}}$	○	○	○	○
15.	Which one of the following factors has **NO** effect on the speed of sound in gas?	Temperature	Density	Humidity	Pressure	○	○	○	○
16.	A transverse wave traveling in rare medium is reflected form the boundary of a denser medium, it undergoes a phase change of:	π radian	0 radian	2π radian	$\frac{\pi}{2}$ radian	○	○	○	○
17.	The blue colour of the sky is due to:	Polarization	Scattering	Diffraction	Reflection	○	○	○	○

- $\hat{A}=\frac{\vec{A}}{|\vec{A}|}$
- $v=\sqrt{\frac{rRT}{m}}$
- $v=\omega\sqrt{x_o^2-x^2}$
- $\eta=1-\frac{T_2}{T_1}$
- $R_{max}=\frac{v_0^2}{g}$
- $C=2\pi r$
- $W=FS\cos\theta$
- $V_{sphere}=\frac{4}{3}\pi r^3$
- $density=\frac{mass}{volume}$
- $H=\frac{v^2\sin^2\theta}{2g}$
- $P=mv$
- $KE=\frac{1}{2}mv^2$
- $v=r\omega$
- $\omega=\frac{2\pi}{T}$
- $T=2\pi\sqrt{\frac{l}{g}}$

ROLL NUMBER					

PHYSICS HSSC–I

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

NOTE: Answer any FOURTEEN parts from Section 'B' and attempts any TWO questions from Section 'C' on the separately provided answer book. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Q. 2 Answer any FOURTEEN parts. All parts carry equal marks. **(14 x 3 = 42)**

(i) Differentiate between random and systematic errors.

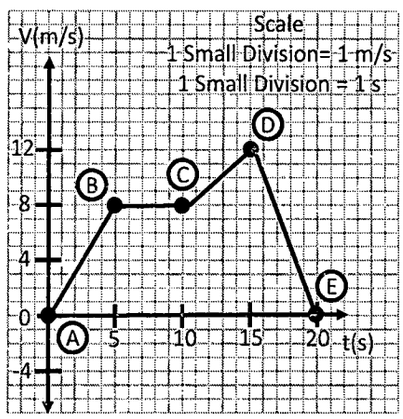
(ii) Check if the famous Einstein equation $E = mc^2$ is dimensionally consistent.

(iii) Two coplanar vectors A and B are making an angle of $60°$ with respect to each other having magnitudes of 4 unit and 5 unit respectively. Find area of parallelogram formed by these vectors.

(iv) The velocity time graph shows the motion of bicyclist:

(a) From the slope of the graph calculate the acceleration of the bicyclist between A and B, B and C, C and D & D and E.

(b) Calculate the average acceleration of the bicyclist.



Q.No.2 (iv)

(v) Under what condition the sum of three vectors results into a null vector? Briefly explain with diagram.

(vi) Describe the term 'escape velocity'. Write its formula in terms of G, m *and* R.

(vii) Show that work done on a body is equal to change in its Kinetic energy.

(viii) What is power? Show power as product of force and velocity.

(ix) Does the apparent weight of a body inside a lift become double, if lift is accelerating upward with acceleration equal to gravitational acceleration (g)? Justify your answer.

(x) What is banking of road? Show that angle of banking is correct for one speed.

(xi) Why does a diver changes his/her body position before and after diving in the pool?

(xii) Discuss aerofoil. State one practical example of aerofoil briefly.

(xiii) What is meant by moment of inertia? Write its mathematical expression and SI units.

(xiv) What is resonance phenomenon? Give one example in which resonance plays an important role.

(xv) The speed of a wave on a particular string is $32 m/s$. If the string is 8m long to what frequency will it resonate?

(xvi) The magnitude of the viscous force in fluid flow depends on the shape and velocity of the object. Justify.

(xvii) What is the effect of variation of pressure on the speed of sound in gas?

(xviii) Briefly explain the function of compensator plate in Michelson interfermeter.

(xix) Is it useful to leave an air-conditioned is left running on a table in the middle of the room? What will happen to the temperature of the room?

(xx) Give two statements for the second law of thermodynamics.

SECTION – C (Marks 26)

Note: Attempt any TWO questions. All questions carry equal marks. **(2 x 13 = 26)**

Q. 3 a. What is meant by elastic and inelastic collisions? Give examples in each case. Derive mathematical equations for calculating the final velocities of the elastically colliding bodies in one dimension. Draw diagrams.

b. Explain whether for two vectors of equal magnitude, is it possible to give a resultant of magnitude equal to their individual magnitude. Justify your answer mathematically.

Q. 4 a. Explain the formation of stationary waves in an open organ pipe. Illustrate your answer with diagrams.

b. Prove that the motion of mass attached to a spring is SHM.

Q. 5 a. Describe the experimental arrangement for the production of interference fringes by Young's double slit method and get an expression for this fringes space. Draw diagrams.

b. Describe the terms 'molar specific heat at constant pressure' (C_P) and 'molar specific heat at constant volume' (C_V). Also prove that ($C_P - C_V = R$)

Important formulae:

- $v = \sqrt{\frac{rRT}{m}}$
- $F_D = 6\pi\eta rv$
- $v = w\sqrt{x_o^2 - x^2}$
- $a = \frac{\vec{v_f} - \vec{v_i}}{t_f - t_i}$
- $\tan\theta = \frac{v^2}{rg}$
- $KE = \frac{1}{2}mv^2$
- $\vec{A} \times \vec{B} = AB\sin\theta$
- $I_1\omega_1 = I_2\omega_2$
- $a = -\omega^2 x$
- $\omega = \frac{2\pi}{T}$
- $\lambda_n = \frac{2L}{n}$