Answer Sheet No
Sig of Invigilator

PHYSICS HSSC-I

SECTION - A (Marks 17)

Time allowed: 25 Minutes

NOTE: Sections—A is compulsory and comprises page 1-2. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

ֆ. 1	Circle	e the co	rrect option i.e.	A/B/	C / D. Each part	carries	one mark.			
	(i)	Light	year is the unit of							
		A.	Time			В.	Distance			
		C.	Light Intensity	/		D.	Speed of light			
	(ii)	The r	moment of force	is called		- •				
		A.	Torque			В.	Impulse			
		C.	Angular mom	entum		D.	Force			
	(iii)	If 'R _x	' is negative an	$d'R_y'$	component is pos	sitive, tl	ne direction of res	ultant '	<i>R</i> ' is	
		A.	$\theta = \phi$	В.	$\theta = 180^{\circ} - \phi$	C.	$\theta = 180^{0} + \phi$	D.	$360^{\circ} - \phi$	
	(iv)	If the	range of project	ile is hal	f to its maximum i	range,	the angle of projec	ction is		
		A.	30°	В.	22.5°	C.	15°	Ð.	45°	
	(v)	The unit of Impulse is								
		A.	Newton	В.	Joule-sec	C.	Joule	D.	Newton-sec	
	(vi)	vi) The energy released by burning 1 litre of petrol is								
		A.	1000 J	В.	$7 \times 10^5 J$	C.	$5\times10^7 J$	D.	$4\times10^5 J$	
(vii) The height of a geostationary satellite above the equator is							tor is	 -		
		Α.	$6.4\times10^6 m$	В.	$3.6\times10^7 m$	C.	$3.6\times10^{-7}m$	D.	6×10^{24} m	
	(viii)	The e	expression for or	bital spe	ed of artificial sate	ellite is		·		
		A.	$v = \sqrt{\frac{GM}{r}}$	В.	$v = \frac{\sqrt{GM}}{r}$	C.	$v = \frac{GM}{r}$	D.	$v = \sqrt{\frac{GM}{2r}}$	
	(ix)	Whic	h of the following	g curves	represents the m	otion o	f water droplet?			
			٧٨ .				^ ↑			
		A.				B.				

D.

DO NOT WRITE ANYTHING HERE

(x)	The i	nstantaneous velocity o	f mass spring s	ystem is _		·					
		$v = v_0 \sqrt{1 - \frac{x^2}{x_o^2}}$		В.	$v = v_0 \sqrt{1 - \frac{1}{2}}$	$\frac{\overline{x_0^2}}{x^2}$					
		$v = x_0 \sqrt{1 - \frac{x^2}{x_0^2}}$			$v = \frac{k}{m} \sqrt{1 - \frac{k}{m}}$	0					
(xi)		ipe is closed at one end	and open at the	e other, th	e fundamental	note prod	uced by it				
			v		21						
	Α.	$f_1 = \frac{v}{4l}$ B.	$f_1 = \frac{1}{2l}$	C.	$f_1 = \frac{\pi v}{v}$	D.	None of these				
(xii)	Colo	urs seen on oily water s	urface are due t	o the							
	A.	Interference of light		B.	Diffraction o	flight					
	C.	Polarization of light		D.	Refraction of	f light					
(xiii)	The t	echnique used to study	the structure of	haemoglo	obin is						
` '	A.	X-rays diffraction		В.	Newton's rir						
	C.	Polarization		D.	Interference						
(xiv)	The r										
	A.	25 m B.		C.	2.5 cm	D.	None of these				
(xv)	The	speed of light in vacuum	is	·							
	A.	3×10^8 cm/sec		В.	3×10^{10} cm	/ sec					
	C.	$3\times10^9 m/\mathrm{sec}$		D.	None of the	se					
(xvi)	The relationship between absolute temperature of an ideal gas and average translational kinetic										
	ener	gy is									
	A.	$T=\frac{2}{3k}<\frac{1}{2}mv^2>$		В.	$T = \frac{3}{2k} < \frac{1}{2}$	$\frac{1}{2}mv^2 >$					
	C.	$T=\frac{2k}{3}<\frac{1}{2}mv^2>$		D.	$T = \frac{3k}{2} < \frac{1}{2}$	$mv^2 >$					
(xvii)	The	cloud formation in atmos	phere is an exa	mple of _		_·					
	A.	Isothermal Process		B.	Adiabatic Pr	rocess					
	C.	Isobaric Process		D.	Isochoric Pr	ocess					
For Ex	amine	r's use only:									
				Total	l Marks:		17				
				Mark	s Obtained:						
			1HA 14	08 (L)——							



PHYSICS HSSC-I

Time allowed: 2:35 Hours

Total Marks Sections B and C: 68

NOTE: Sections B and C comprise pages 1-2. Answer any fourteen parts from Section 'B' and any two questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet—B if required. Write your answers neatly and legibly.

SECTION - B (Marks 42)

Q. 2 Answer any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines. (14 x3 = 42)

- Show that the expression $f = \frac{1}{2l} \sqrt{\frac{F \times l}{m}}$ is dimensionally correct, when 'f' is the frequency of vibrations on stretched string of tension 'F', length 'l' and mass 'm'.
- (ii) Why is it easier to open a tightened nut with a long spanner?
- (iii) What is the unit vector in the direction of vector $A = 4\hat{i} + 3\hat{j}$?
- (iv) A projectile is thrown with initial velocity 19.6m / sec at an angle 30° with the horizontal. How much time it will take to reach the maximum height?
- (v) A girl drops a cup from a certain height, which breaks into pieces. What are the energy changes involved?
- (vi) The absolute potential energy of a body on the surface of earth is negative. What does it mean?
- (vii) Define Radian.
- (viii) What is Einstein's view of gravitation?
- (ix) Explain the working of a carbuoretor of a motor-car using Bernoulli's principle.
- (x) What is Torr? How is it related with Pascal?
- (xi) A simple pendulum is 50.0 cm long. What will be its frequency of vibration at a place where $g = 9.8m/\sec^2 ?$
- (xii) A body of mass 4 kg is attached to a spring of spring constant 196 N / m and set into vibration.
 What is its vibrational angular frequency?
- (xiii) What is Laplace correction?
- (xiv) What are the coherent sources of light?
- (xv) In a double slit experiment the second order maximum occurs at $\theta = 0.25^{\circ}$. The wavelength is 650 nm. Determine the slit separation.
- (xvi) An astronomical telescope having magnifying power of 5 consists of two thin lenses 24 cm apart.Find the focal lengths of the lenses.
- (xvii) Calculate the critical angle for an optical fibre having core of refractive index 1.50 and cladding of refractive index 1.48.
- (xviii) Write the postulates of kinetic theory of gases.
- (xix) A heat engine performs 100 J of work and at the same time rejects 400 J of heat energy to the cold reservoirs. What is the efficiency of the engine?

SECTION - C (Marks 26)

Attempt any TWO questions. All questions carry equal marks.

Note:

 $(2 \times 13 = 26)$

05

Q. 3	a.	State Rotational Kinetic energy. Derive the expression of rotational kinetic energy of a disc and a hoo	p.
		Why does a disc move faster than a hoop on an inclined plane?	80
	b.	According to Ohm's law V=IR. If the potential difference 'V' and resulting current 'I' are $V=5.2\pm0.1$	
		volts, $I=0.84\pm0.05$ Amp, find the value of 'R' and its uncertainty.	05
Q. 4	a.	What is the law of conservation of energy? How is it verified in mass-spring system?	08
	b.	A church organ consists of pipes, each open at one end, of different lengths.	
		The minimum length is 30 mm and longest is 4 m. Calculate the frequency range of the fundamental	
		notes? (Speed of sound = 340 m/sec).	05
Q. 5	a.	What are the Molar Specific heats of a gas? Prove that molar specific heat of a gas at constant	
		pressure is greater than molar specific heat at constant volume.	80
	b.	A compound microscope has lenses of focal length 1.0 cm and 3.0 cm. An object is placed 1.2 cm	

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lenses and the magnification of the instrument.

from the object lens. If a virtual image is formed 25 cm from the eye, calculate the separation of the

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- (i) The solid angle of the sphere is
 - A. 12.57 Sr.

B. 6.28 Sr.

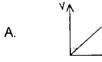
C. 3.14 Sr.

- ח 57.3 Sr.
- (ii) How would the two vectors of the same magnitude have to be oriented, if they were to be combined to give a resultant equal to a vector of the same magnitude?
 - 90^{0} A.

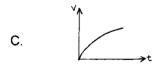
 0^{0} В

 45^{0} C.

- D. None of these
- (iii) A positive charge particle is moving in a uniform magnetic field with constant velocity. Its direction with respect to the magnetic field is
 - 120^{0} A.
- 0^{0} B.
- 30^{0} C.
- 60^{0} D.
- (iv) Which of the following curves represents rocket motion?



B.



D.

A projectile is thrown upward with velocity " v_i " and angle " θ " with respect to the horizontal. (v)

At what point is its velocity $v_i \cos \theta$?

- Initial A.
- Highest B.
- C. Final
- D. None of these
- The work done to move a body along x-axis is said to be positive, if applied force is in the (vi) quadrants ___
 - A. I, IV
- B. II, III
- C. I, III
- D. II, IV

- Moment of inertia of a solid disc is _____ (vii)
 - mr^2 A.
- B. $\frac{1}{2}mr^2$ C. $\frac{3}{2}mr^2$
- D. $\frac{2}{5}mr^2$

DO NOT WRITE ANYTHING HERE

				s Obtained:	[
For Ex	camine	er's use only:			T_4	l Marks:		17			
	A.	Power	В.	Work	C.	Force	D	Temperature			
(xvii)	_	s is enclosed ir as is		ner having press —	sure 'P' a	nd volume 'V'. T	he produ	ct of 'P' and 'V' o			
	C.	Law of refle	ection		D.	Ohm's law					
(xvi)	Critic A.	al angle of gla Huygens pr		mined by	· B.	Snell's law					
	C.	No unit	•		D.	Diopter .					
(//*/	Α.	Joule	mg power	,	В.	Watt					
(xv)			ina power	of an instrumer		Billiaotion					
	С.	Glare	''		D.	Diffraction	· y				
(xiv)	The posterior called A.			ne the concentra	ation of s	ugar in the blood Optical activit					
	Ά.	Red shift	B.	Blue shift	C.	White shift	D.	None of these			
(xiii)	Stars	moving towar	d the eartl	n show a		<u>_</u>					
	C.	315 m / sec	;	•	D.	972 m / sec					
(,	Α.	332 m / sec			В.	1483 m / sec					
(xii)		speed of sound		at $20^{\circ}C$ is	J.	2000 01 (1.2.					
	A. C.	Damping Loss of P.E			B. D.	Loss of K.E. a	and P.E				
(xi)	The sharpness of the resonance curve of resonating system depends on (the)										
	C.	$\sqrt{\frac{k}{2m}}$			D.	$\sqrt{\frac{2k}{m}}$					
	A.	$\omega = \sqrt{\frac{k}{m}}$			В.	$\omega = \frac{k}{m}$					
(x)	In a mass-spring system, the angular frequency of a vibrating body is										
	C.	Terminal Ve			D.	Equation of o					
(ix)	A.	Stokes's lav		ergy is the basi	B.	Bernoulli's eq	uation				
/iv\	A.	100 m	B.	10 km ergy is the basi	C.	10 m	D.	1 km			



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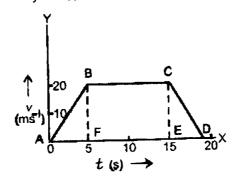
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SECTION - B (Marks 42)

Q. 2 Attempt any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines. (14 x3 = 42)

- (i) The terminal velocity of the water droplet is expressed as $V_t = \frac{2\delta gr^2}{9\eta}$
 - Show that this equation is dimensionally consistent.
- (ii) Stand with one arm and the side of one foot pressed against a wall. Can you raise the other leg side ways? If not, then why not?
- (iii) Find the angle between the two vectors $A = 5\hat{i} + \hat{j}$ and $B = 2\hat{i} + 4\hat{j}$.
- (iv) The velocity-time graph of a car moving on a straight road is shown in the following figure. Find the distance covered by the car.



- (v) What are Solar cells? How do they convert light energy into electric energy?
- (vi) How much kilo-joules energy is consumed by a 100 watt bulb in 10 minutes?
- (vii) A circular hoop of mass 2 kg revolves about its own axis with angular speed 5 rad / sec. The radius of hoop is 20 cm. Find the rotational kinetic energy of the hoop.
- (viii) A disc and a hoop start moving down from the top of inclined plane at the same time. Which one will be moving faster on reaching the bottom?
- (ix) A stream of water flowing from a tap becomes narrower as it falls. Why?
- (x) How is the Bernoulli's equation applied to explain the lift on an aeroplane?
- (xi) A simple pendulum is mounted in a lift. How does its time period vary if the lift is moving up with uniform acceleration?
- (xii) What is Resonance?
- (xiii) As a result of a distant explosion, an observer senses a ground tremor and then hears the explosion. Explain the time difference.
- (xiv) State Huygen's principle.
- (xv) How is the distance between interference fringes affected by the separation between the slits of Young's experiment? Can fringes disappear?
- (xvi) Why is it advantageous to use a lens of small focal length in simple microscope?
- (xvii) How is the light signal transmitted through the optical fiber?
- (xviii) What is the average translational kinetic energy of molecules in a gas at temperature 27° (? $(k = 1.38 \times 10^{-23} \ J/K)$
- (xix) Why can we not construct a heat engine having 100 % efficiency?

SECTION - C (Marks 26)

		SECTION - C (marks 20)	
Note:		Attempt any TWO questions. All questions carry equal marks. (2 x 13 = 2	26
Q. 3	a.	Define Cross product of two vectors. Explain it with any two examples.	
		Also write the characteristics of cross product.	80
	b.	Find the angle of projection of a projectile for which its maximum height and horizontal range	
		are equal.	05
Q. 4	a.	Define Work done by a constant force. How is the work done in gravitational field?	
		Prove that gravitational field is a conservative field.	80
	b.	How large must a heating duct be if air moving 3 m/sec along it can replenish the air in a room of	
		$300m^3$ volume every 15 min? Assume the density of the air remains constant.	05
		•	
Q. 5	a.	Explain Young's Double Slit experiment and show that the bright and dark fringes are of equal width	
		and are equally spaced.	80
	b.	336 J of energy is required to melt 1 g of ice at $0^{\circ}C$. What is the change in entropy of 30 g of water	
		at $0^{0}C$ as it is changed to ice at $0^{0}C$ by a refrigerator?	05