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11 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI – 606 603

MARCH 2019

What is the angular displacement made by a particle after 5s, when it starts from

	rest with an angular acceleration 0.2 rad s ⁻² ?											
	(a)	4 rad	(b)	1 rad	(c)	2.5 rad	(d)	5 rad				
2.	The pr	ocess in whic	h heat	transfer is by	actual	movement	of molecu	ules in fluids				
	such a	s liquids and	gases is	s called:								
	(a)	thermal cond	uctivity		(b)	Convectio	n	X				
	(C)	Conduction			(d)	Radiation		~				
3.	Which of the following pairs of physical quantities have the same dimensions?											
	(a)	Torque and P	ower		(b)	Force and	torque					
	(C)	Force and Po	wer		(d)	Torque and	d Energy					
4.	For a s	satellite movir	ng in ar	n orbit around	the ear	rth, the rati	o of kine	tic energy to				
	potent	ial energy is :				X						
	(a)	2	(b)	$\sqrt{2}$	(c)	$\frac{1}{2}$	(d)	$\frac{1}{\sqrt{2}}$				
5.	There	is a small bub	ble at o	ne end and big	ger buk	ble at othe	r end of a	pipe. Which				
	among the following will happen?											
			/	\sim								
	A		$= \langle$	в								
	(a)	remains in ec	quilibriu	m								
	(b)	smaller will g	row unt	il they collapse	9							
	(c)	bigger will g	row unt	il they collaps	e	(d) non	e of the a	above				
6.	A refri	gerator has CO	OP of 3.	. How much we	ork mus	st be suppli	ed to a re	efrigerator in				
	order t	o remove 200) J of he	at from its inte	erior?							
	(a)	33.33 J	(b)	44.44 J	(c)	66.67 J	(d)	50 J				
7.	lf the t	emperature o	f the wi	re is increased	, then t	he Young's	Modulus	will :				
	(a)	increase rapi	dly		(b)	increase by very small amount						
	(C)	remain the sa	ame		(d)	decrease						
8.	lf the ii	nternal energy	of an io	deal gas U and	volume	V are doub	led, then	the pressure				
	of the	gas :										
	(a)	halves	(b)	quadruples	(C)	doubles	(d) rema	ins same				

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- 9. A body of mass 5 kg is thrown up vertically with a kinetic energy of 1000 J. If acceleration due to gravity is 10 ms⁻², find the height at which the kinetic energy becomes half of the original value.
 - (a) **10 m** (b) 20 m (c) 50 m (d) 100 m
- 10. Which graph represents uniform acceleration?



- 11. In an isochoric process, find which is relevant among the following:
 - (a) $\Delta U = 0$ (b) $\Delta T = 0$ (c) W = 0 (d) Q = 0
- 12. The amplitude and time period of a simple pendulum bob are 0.05 m and 2 s respectively. Then the maximum velocity of the bob is :
- (a) 0.157 ms⁻¹ (b) 0.257 ms⁻¹ (c) 0.10 ms⁻¹ (d) 0.025 ms⁻¹
 13. A closed cylindrical container is partially filled with water. As the container rotates in a horizontal plane about a perpendicular bisector, its moment of inertia:
 - (a) remains constant (b) depends on the direction of rotation
 - (c) increase (d) decrease
- 14. Which of the following represents a wave?

(a)
$$\frac{1}{x+vt}$$

(b) $\sin(x + vt)$ (c) $(x - vt)^3$ (d) x(x + vt)

- 15. If the linear momentum of the object is increased by 0.1 %, then the kinetic energy is increased by:
 - (a) 0.4% (b) 0.01% (c) 0.1% (d) 0.2%

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11 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI – 606 603

MARCH 2020

1.	Identify the unit vector in the following										
	(a)	$\frac{\hat{\iota}+\hat{j}}{\sqrt{2}}$	(b)	$\hat{\iota} + \hat{j}$	(c)	$\frac{\hat{\iota}}{\sqrt{2}}$	(d)	$\hat{k} - \frac{\hat{j}}{\sqrt{2}}$			
2.	Huma	in audible wav	elength	range (velocit	y of sou	und in air = 34	0 ms ⁻¹) is :			
	(a)	17 m to 170	m		(b)	0.17 m to 17	'n				
	(c)	0.017 m to 1	L7 m		(d)	1.7 m to 17	m	X			
3.	An air column in a pipe which is closed at one end, is in resonance with the vibrating										
	body of frequency 83 Hz. Then the length of the air column is :										
	(veloc	ity of sound in	air = 3	32 ms⁻¹)			AA				
	(a)	1.5 m	(b)	0.5 m	(C)	2.0 m	(d)	1.0 m			
4.	rms s	peed of hydrog	gen mol	ecule at 27º C	:						
	(a)	193 kms ⁻¹	(b)	1.93 kms ⁻¹	(C)	19.3 kms ⁻¹	(d) C).193 kms ⁻¹			
5.	Which one of the following is a scalar quantity?										
	(a)	Speed			(b)	Velocity					
	(c)	Displacemen	t		(d)	Linear mome	entum				
6.	The length of a body is measured as 3.51 m. If the accuracy is 0.01m, then the										
	perce	ntage error in t	the mea	asurement is :							
	(a)	0.035 %	(b)	351%	(C)	1%	(d)	0.28 %			
7.	A bod	y of mass 20	kg mo	ving with a sp	eed of	10 ms ⁻¹ on a	horizo	ontal smooth			
	surface collides with a massless spring of spring constant 5 N/m. If the mass stops										
	after	collision, distai	nce of c	compression of	the sp	ring will be :					
	(a)	10 m	(b)	50 m	(C)	5 m	(d)	20 m			
8.	When a car takes a sudden left turn on a curved road, passengers are pushed										
	towar	ds the right du	e to :								
	(a)	absence of ir	nertia		(b)	inertia of dir	ection				
	(c)	inertia of mo	tion		(d)	inertia of res	t				
9.	The ef	fficiency of a h	eat eng	ine working be	tween t	he freezing po	int and	boiling point			
	of wat	ter is :									
	(a)	12.5 %	(b)	6.25 %	(C)	20 %	(d)	26.8 %			

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- 10. A spring of force constant k is cut into two pieces such that the length of one piece is double the length of the other. Then the longer piece will have a force constant of :
 - (a) 6 k (b) $\frac{2}{3}$ k (c) $\frac{3}{2}$ k (d) 3k
- 11. The dimensional formula for Moment of Inertia:
 - (a) $ML^{-1}T^{-1}$ (b) $ML^{2}T^{-2}$ (c) MLT^{2} (d) ML^{2}
- 12. Which one of the following P-V diagrams correspondents to isobaric compression?



- 13. The ratio between the rms speed and most probable speed of gas molecules at a given temperature is :
 - (a) $2\sqrt{2}:\sqrt{1}$ (b) $\sqrt{3}:\sqrt{2}$ (c) $\sqrt{2}:\sqrt{3}$ (d) $\sqrt{1}:2\sqrt{2}$
- 14. If the distance between the Earth and Sun is twice its present value, the number of days in a year will be :
 - (a) 730 (b) **1032** (c) 64.5 (d) 182.5
- 15. Moment of inertia of a solid of Mass M, length l and radius r about its own axis is :

(a)
$$M\left(\frac{r^2}{2} + \frac{l^2}{12}\right)$$
 (b) Mr^2
(c) $\frac{1}{4}Mr^2$ (d) $\frac{1}{2}Mr^2$

5 11 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI - 606 603 **SEPTEMBER 2020** 1. If the error in the measurement of radius of a sphere is 2%, then the error in the determination of its volume will be : (a) 8 % (b) 2 % (C) 4 % (d) **6** % 2. A stone of mass 0.5 kg tied to a string executes uniform circular motion in a circle of radius 2 m with a speed of 4 ms⁻¹. The magnitude of tension acting on the stone will be : 3 N (b) 10 N (C) 0.5 N (a) (d) 4 N 3. If a particle executes uniform circular motion in the xy plane in clockwise direction, then the angular velocity is in: + y direction (b) + z direction (a) - z direction (d) x direction (C) 4. The velocity – time (v-t) graph representing motion of particle moving with uniform velocity is : v (a) (a) (b) t t (d) (c) 5. A rigid body rotates with an angular momentum L. If its kinetic energy is halved, then angular momentum becomes: $\frac{L}{\sqrt{2}}$ L 2 (a) L (b) (C) 2L (d) 6. The energy consumed in electrical units when a 60 W fan is used for 8 hours daily

(a) **14 units** (b) 18 units (c) 16 units (d) 20 units

one month (30 days) is nearly:

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11 Std	. PHYSI	CS, PREVIOUS	YEAR G RAJE SRMI	OVERNMENT E INDRAN M, M.S MHSS, KAVERI	XAM ON Sc., B.Ed YAMPOC	IE MARK QUES I., C.C.A., PG. TI DNDI, TIRUVANI	TION W EACHER NAMAL	ITH ANSWER IN PHYSICS AI - 606 603	
7.	In a vertical circular motion, the minimum speed at the lowest point required by the								
	mass to complete circular motion is (Radius of the circular path is r) :								
	(a)	$\sqrt{2gr}$	(b)	2gr	(c)	$\sqrt{5gr}$	(d)	5gr	
8.	The we	ettability of a s	surface	by a liquid dep	ends p	rimary on :			
	(a)	viscosity			(b)	surface tensi	on		
	(C)	density							
	(d)	angle of cont	tact be	tween surface	and th	e liquid			
9.	An obj	ect of mass 10) kg is h	anging from a	springs	scale which is a	attache	d to the roof	
	of a lif	t. If the lift is ir	n free fa	all, the reading	; in the s	spring scale is	:		
	(a)	98 N	(b)	zero	(C)	49 N	(d)	9.8 N	
10.	All nat	ural processes	s occur	such that entr	opy sho	ould:			
	(a)	always increa	ase		(b)	always decrea	ase		
	(C)	first increase	and the	en decrease	(d)	does not char	nge		
11.	The g	raph between	volume	e of a given r	mass of	f gas and tem	nperatu	re when its	
	pressu	ire remains co	nstant	is :					
	(a)	an ellipse			(b)	a circle			
	(c)	a straight lin	е		(d)	a parabola			
12.	When	a damped ha	rmonic	oscillator com	pletes	100 oscillatio	ns, its a	amplitude is	
	reduce	ed to $\frac{1}{3}$ of its ir	nitial va	lue. What will	be its a	mplitude whe	n it con	npletes 200	
	oscilla	tions?	M						
	(a)	$\frac{1}{5}$	(b)	$\frac{2}{3}$	(C)	$\frac{1}{6}$	(d)	$\frac{1}{9}$	
13.	Which	of the followir	ng is an	example of no	on-linea	r triatomic mol	lecule?		
	(a)	Water	(b)	Hydrogen	(C)	Helium	(d)	Nitrogen	
14.	If S _P a	nd S_V denote	the spe	ecific heats of	nitroge	en gas per unit	t mass	at constant	
	pressu	ire and consta	int volu	me respective	y, then	:			
	(a)	S _P – S _V =28 F	२		(b)	$S_P - S_V = R/2$	28		
	(C)	$S_{P} - S_{V} = R/1$	_4		(d)	$S_P - S_V = R$			
15.	The fir	st three freque	encies d	of harmonics o	f a clos	ed organ pipe	will be	in the ratio :	
	(a)	1:2:3	(b)	1:3:5	(C)	1:4:9	(d)	2:4:6	

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11 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI – 606 603

AUGUST 2021

1. Two equal masses m_1 and m_2 are moving along the same straight line with velocities 5 ms⁻¹ and -9 ms⁻¹ respectively. If the collision is elastic, then calculate the velocities after the collision of m_1 and m_2 , respectively. -9 ms⁻¹ and 5 ms⁻¹ (b) -4 ms⁻¹ and 10 ms⁻¹ (a) 5 ms⁻¹ and 1 ms⁻¹ 10 ms^{-1} and 0 ms^{-1} (C) (d) 2. If a particle executes uniform circular motion in the xy plane in clockwise direction, then the angular velocity is in: -z direction (b) +y direction (a) -x direction (d) +z direction (C) 3. A hollow sphere is filled with water. It is hung by a long thread. As the water flows out of a hole at the bottom, the period of oscillation will: (a) increase continuously first increase and then decrease (b) (d) decrease continuously first decrease and then increase (C) 4. Which of the following is not a Scalar? (a) Pressure (b) Viscosity (C) **Stress** (d) Surface tension 5. If an object is thrown vertically up with the initial speed u from the ground, then the time taken by the object to return back to ground is: u 2u (a) (C) (d) (b) 2g 6. The efficiency of a heat engine working between the freezing point and boiling point of water is: 26.8% (b) 6.25% (d) 20% (a) (C) 12.5% 7. When an object is at rest on the inclined rough surface: Static friction is not zero and kinetic friction is zero (a) (b) Static and kinetic frictions acting on the object is zero (C) Static and kinetic frictions are not zero (d) Static friction is zero but kinetic friction is not zero 8. A couple produces: rotation and translation pure rotation (a) (b) (C) no motion (d) pure translation

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11 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI – 606 603

- 9. A transverse wave moves from a medium A to a medium B. In medium A, the velocity of the transverse wave is 500 ms⁻¹ and the wavelength is 5 m. The frequency and the wavelength of the wave in medium B when its velocity is 600 ms⁻¹, respectively are:
 - (a) 120 Hz and 6 m (b) 120 Hz and 5 m
 - (c) **100 Hz and 6 m** (d) 100 Hz and 5 m
- 10. The dimensional formula of Planck's constant h is:
 - (a) $[MLT^{-1}]$ (b) $[ML^{2}T^{-1}]$ (c) $[ML^{3}T^{-3}]$ (d) $[ML^{2}T^{-3}]$
- 11. The unit of surface energy is:
 - (a) Nm³ (b) Nm⁻² (c) Nm (d) Nm⁻¹
- 12. The gravitational potential energy of the Moon with respect to Earth is:
 - (a) can be positive or negative (b) always positive
 - (c) always zero (d) always negative
- 13. A spring is connected to a mass 'm' suspended from it and its time period for vertical oscillation is 'T'. The spring is now cut into two equal halves and the same mass is suspended from one of the halves. The period of vertical oscillation is:
 - (a) $T' = \sqrt{2T}$ (b) $T' = \sqrt{2}T$ (c) $T' = \sqrt{\frac{T}{2}}$ (d) $T' = \frac{T}{\sqrt{2}}$
- 14. If the internal energy of an ideal gas U and Volume V are doubled then, the Pressure:
 - (a) halves (b) doubles
 - (c) quadruples (d) remains same
- 15. Consider a circular levelled road of radius 10 m having coefficient of static friction 0.81. With what speed a car has to move on the turn so that it will have safe turn? (g=10 ms⁻²)
 - (a) 12 ms^{-1} (b) 8 ms^{-1} (c) 14 ms^{-1} (d) 10 ms^{-1}

MAY 2022

- A transverse wave moves from a medium A to a medium B. In medium A, the velocity of the transverse wave is 500 ms⁻¹ and the wavelength is 5 m. The frequency and the wavelength of the wave in medium B when its velocity is 600 ms⁻¹, respectively are
 - (a) 120 Hz and 6 m (b) 120 Hz and 5 m
 - (c) **100 Hz and 6 m** (d) 100 Hz and 5 m
- 2. When a car takes a sudden left turn in the curved road, passengers are pushed towards the right due to
 - (a) inertia of rest (b) inertia of direction
 - (c) absence of inertia (d) inertia of motion
- 3. Two equal masses m_1 and m_2 are moving along the same straight line with velocities 5 ms⁻¹ and -9ms⁻¹ respectively. If the collision is elastic, then calculate the velocities after the collision of m_1 and m_2 , respectively
 - (a) -9ms⁻¹ and 5 ms⁻¹ (b) -4ms⁻¹ and 10 ms⁻¹
 - (c) 5 ms⁻¹ and 1 ms⁻¹ (d) 10ms⁻¹ and 0 ms⁻¹
- 4. Two objects are projected at angles 30° and 60° respectively with respect to the horizontal direction. The ranges of two objects are denoted as R_{30}° and R_{60}° . Choose the correct relation from the following

(a) $R_{30}^0 = \frac{R_{60}^0}{2}$ (b) $R_{30}^0 = R_{60}^0$ (c) $R_{30}^0 = 2R_{60}^0$ (d) $R_{30}^0 = 4R_{60}^0$

- 5. The dimensional formula strain:
 - (a) ML⁻²T⁻¹ (b) M⁰L⁰T⁰ (c) ML⁻¹T⁻² (d) M⁰LT⁰
- 6. The efficiency of a heat engine working between the freezing point and boiling point of water is
 - (a) **26.8%** (b) 6.25% (c) 12.5% (d) 20%
- 7. Which of the following is not a scalar?
 - (a) pressure (b) viscosity
 - (c) stress (d) surface tension
- If a particle executes uniform circular motion in the xy plane in clock wise direction, then the angular velocity is in
 - (a) -z direction (b) +y direction (c) -x direction (d) +z direction

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9.	. The ratio $\gamma = \frac{C_p}{C_v}$ for a gas mixture consisting of 8 g of helium and 16 g of oxygen									
	is									
	(a)	27/17	(b)	23/15	(C)	17/27	(d)	15/23		
10.	1 kilow	/att hour (1 k\	Wh) is:							
	(a)	36 x 10 ⁵ J			(b)	36 x 105 W	/S			
	(C)	3.6 x 10 ⁶ J			(d)	All the above	/e (mere	attempt)		
11.	A simple pendulum is suspended from the roof of a school bus which moves in a									
	horizontal direction with an acceleration a, then the time period is									
	(a) T $\propto \sqrt{g^2 + a^2}$					$\propto \frac{1}{g^2 + a^2}$				
	(c) T∝	$(g^2 + a^2)$			(d) T	$\propto \frac{1}{\sqrt{g^2+a^2}}$				
12.	A couple produces,					60	7			
	(a)	rotation and	transla	tion	(b)	pure rotation	on			
	(C)	no motion			(d)	pure transl	ation			
13.	If the mass and radius of the Earth are both doubled, then the acceleration due to									
	gravity	g′								
	(a)	2 g			(b)	remain s sa	ame			
	(C)	4 g		HAN	(d)	<u>g</u> 2				
14.	lf π = 3	3.14, then the	value o	of π² is						
	(a)	9.86	(b)	9.8596	(C)	9.9	(d)	9.860		
15.	lf the a speed	acceleration d	lue to g	ravity becom	nes 4 tim	nes its origina	al value,	then escape		
	(a) becomes halved					remains sa	ime			
	(c)	4 times of ori	iginal va	alue	(d)	2 times of	original	value		

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AUGUST 2022

- 1. A ball of mass 1 kg and another of mass 2 kg are dropped from a tall building whose height is 80 m. After, a fall of 40 m each towards Earth, their respective kinetic energies will be in the ratio of $\sqrt{2}:1$ $1:\sqrt{2}$ (a) (b) (C) 2:1 (d) 1:2 2. If an object is dropped from the top of a building and it reaches the ground at t = 4 s then the height of the building is (ignoring air resistance) (g = 9.8 ms^{-2}) 78.4 m 80.5 m (d) (a) 77.3 m (b) (C) 79.2 m 3. A pendulum is hung in a very high building oscillates to and fro motion freely like a simple harmonic oscillator. If the acceleration of the bob is 16 ms⁻² at a distance of 4 m from the mean position, then the time period is (b) 2 s (a) 1 s (C) 2πs (d) πs 4. ge and gp denote the acceleration due to gravity in the Earth and a planet. The mass and radius of the planet are twice that of the Earth. Then _____ $g_p = \frac{g_e}{2}$ $g_p = \frac{g_e}{\sqrt{2}}$ (d) (a) (b) $g_p = 2g_e$ (c) $g_p = g_e$ 5. A rope is wound around a hollow cylinder of mass 3 kg and radius 40 cm. What is the angular acceleration of the cylinder if the rope is pulled with a force 30 N? 0.25 rad s⁻² 25 rad s⁻² (C) 5 m s s^{-2} (a) (b) (d) 25ms⁻² 6. When a cycle tyre suddenly bursts, the air inside the tyre expands. This process is isothermal (b) adiabatic (C) isobaric (d) (a) isochoric 7. If a particle executes uniform circular motion, choose the correct statement The velocity and speed are constant. (a) (b) The acceleration and speed are constant. The velocity and acceleration are constant. (C) (d) The speed and magnitude of acceleration are constant. 8. An object of mass 10 kg is hanging on a spring scale which is attached to the roof of a lift. If the lift is in free fall, the reading in the spring scale is
 - (a) 98 N (b) zero (c) 49 N (d) 9.8 N

9. A uniform rope having mass m hangs vertically from a rigid support. A transverse wave pulse is produced at the lower end. Which of the following plots shows the correct variation of speed *v* with height *h* from the lower end?



(d) Normal force exerted by the table on the book.

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- 15. In stationary waves, the distance between a node and its neighbouring anti-node is:
 - (a) $\frac{\lambda}{4}$ (b) $\frac{\lambda}{2}$ (c) $\frac{3\lambda}{4}$ (d) λ

MARCH 2023

1.	If a wire is stretched to double of its original length, then the strain in the wire is										
	(a)	3	(b)	1	(c)	4	(d)	2			
2.	Round of the following number 19.95 into three significant figures.										
	(a)	20.1	(b)	19.9	(c)	19.5	(d)	20.0			
3.	The graph between volume and temperature in Charles' law is										
	(a)	a straight lin	е			(b) an ellipse					
	(C)	a parabola			(d)	a circle					
4.	In the given SHM y = 2 sin (20 π t+1.5) the frequency of oscillation is:										
	(a)	10 Hz	(b)	20 Hz	(c)	15 Hz	(d)	πHz			
5.	The kinetic energy of the satellite orbiting around the Earth is										
	(a)	greater than I	kinetic e	energy	(b)	equal to potential energy					
	(C)	zero			(d)	less than pot	ential e	energy			
6.	The centrifugal force appears to exist										
	(a)	in any accelerated frame									
	(b)	only in inertial frames									
	(C)	both in inertial and non-inertial frames									
	(d)	only in rotati	ng fram	nes							
7.	If an object is falling from a height of 20 m, then the time taken by the object to										
	reach the ground: (ignore air resistance and take $g = 10 \text{ ms}^{-2}$)										
	(a)	2 s	(b)	1.732 s	(C)	1.532 s	(d)	1.414 s			
8.	The fundamental frequency of closed organ pipe whose length is 10 cm is:										
	(a)	4.5 vHz	(b)	2.5 vHz	(C)	10 vHz(d)	2 vHz				
9.	A part	icle executing	SHM c	rosses points	A and	B with the sar	ne velo	city. Having			
	taken	3 s in passing	from A	to B, it returns	s to B a	ifter another 3	s. The	time period			
	is										
	(a)	12 s	(b)	15 s	(C)	9 s	(d)	6 s			

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L 2

(d)

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11 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI – 606 603

- 10. If the temperature and pressure of a gas is doubled the mean free path of the gas molecules
 - (a) tripled (b) remains same
 - (c) quadrupled (d) doubled

11. A uniform force of $(2\hat{i} + \hat{j})$ + N acts on a particle of mass 1 kg. The particle displaces from position $(3\hat{j} + \hat{k})$ m to $(5\hat{i} + 3\hat{j})$. The work done by the force on the particle is :

- (a) 10 J (b) 9 J (c) 12 J (d) 6 J
- 12. A rigid body rotates with an angular momentum L. If its kinetic energy is halved, the angular momentum becomes,
 - (a) 2L (b) L (c) $\frac{L}{\sqrt{2}}$

13. Which one of the following physical quantities cannot be represented by a scalar?

- (a) momentum (b) Mass
- (c) magnitude of acceleration (d) length

14. The dimensional formula for coefficient of viscosity is :

- (a) ML⁻²T⁻² (b) MLT⁻² (c) ML⁻¹T⁻² (d) ML⁻¹T⁻¹
- 15. A sound wave whose frequency is 5000 Hz travels in air and then hits the water surface. The ratio of its wavelengths in water and air is
 - (a) 5.30 (b) 4.30 (c) 1.23 (d) 0.23

JUNE 2023

1.	The speed of light in an isotropic medium depends on ,										
	(a)	its density				(b) it	(b) its wavelength				
	(C)	the nature of propagation									
	(d)	the motion of the source w.r.t. medium									
2.	A circular coil of radius 5 cm and 50 turns carries a current of 3 ampere.										
	The magnetic dipole moment of the coil is nearly:										
	(a)	1.0 Am ²	(b)	1.2 Am ²	(C)	0.5 Am ²	(d)	0.8 Am ²			
3.	Two w	ires of A and B	with ci	rcular cross se	ection a	re made u	up of the sa	me material			
	with e	qual lengths. S	Suppose	$e R_A = 3 R_B$, the	en what	is the rat	tio of radius	of wire A to			
	that of	f B?									
	(a)	3	(b)	$\sqrt{3}$	(c)	$\frac{1}{\sqrt{3}}$	(d)	$\frac{1}{3}$			
4.	Which of the following electromagnetic radiation is used for viewing objects through										
	fog?				A						
	(a)	Microwave	(b)	Gamma rays	(c)	X- rays	(d)	Infrared			
5.	Emissi	ion of electron	s by the	absorption of	heat e	nergy is ca	alled	emission.			
	(a)	photoelectric	(b)	field	(c)	thermior	nic (d)	secondary			
6.	In a series RL circuit, the resistance and inductive reactance are the same. Then										
	the ph	ase difference	betwee	en the voltage	and cu	rrent in th	e circuit is				
	(a)	$\frac{\pi}{4}$	(b)	$\frac{\pi}{6}$	(C)	$\frac{\pi}{2}$	(d)	zero			
7.	lf the r	nuclear radius	of Al ²⁷	is 3.6 fermi, tl	he appr	roximate r	nuclear radiu	us of Cu ⁶⁴ is			
	(a)	2.4	(b)	1.2	(c)	4.8	(d)3.6			
8.	The barrier potential of a silicon diode is approximately,										
	(a)	0.7 V	(b)	0.3V	(C)	2.0 V	(d)	2.2V			
9.	An electric dipole is placed at an alignment angle of 300 with an electric field of										
	2×10 ⁵ NC ⁻¹ . It experiences a torque equal to 8 N m. The charge on the dipole if the										
	dipole	e length is 1 cm is									
	(a)	4 mC	(b)	8 mC	(C)	5 mC	(d)	7 mC			
10.	For lig	ht incident fro	m air o	n a slab of re	fractive	e index 2,	the maximu	um possible			
	angle	of refraction is	,								
	(a)	30 °	(b)	45°	(C)	60°	(d)	90°			

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11 Std. PHYSICS, PREVIOUS YEAR GOVERNMENT EXAM ONE MARK QUESTION WITH ANSWER RAJENDRAN M, M.Sc., B.Ed., C.C.A., PG. TEACHER IN PHYSICS SRMMHSS, KAVERIYAMPOONDI, TIRUVANNAMALAI – 606 603

11. Light transmitted by Nicol prism is, (a) partially polarised (b) un polarised (C) plane polarised (d) elliptically polarised 12. The vertical component of Earth's magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place? (a) 30° (b) **45**° (C) 60° (d) 90° 13. The materials used in Robotics are (a) Aluminium and silver (b) Silver and gold Copper and gold (d) Steel and aluminium (C) 14. The threshold wavelength for a metal surface whose photoelectric work function is 3.313 eV is 4125Å (b) 3750Å 6000Å 20625.Å (a) (C) (d) 15. The principle based on which a solar cell operates is Diffusion (a) (b) Recombination (C) **Photovoltaic action** (d) Carrier flow

MARCH 2019

- 1. Write any two errors of systematic errors. Explain them.
- 2. What is projectile? Give two examples.
- 3. State Newton's Second Law of Motion.
- A car takes a turn with the velocity 50 ms⁻¹ on a circular road of radius of curvature 10 m. Calculate the centrifugal force experienced by a person of mass 60 kg inside the car.
- 5. Why is it more difficult to revolve a stone tied to a longer string than a stone tied to a shorter string?
- 6. State Stefan Boltzmann Law and write its expression.
- 7. List the factors affecting Brownian motion.
- 8. "Soldiers are not allowed to march on a bridge." Give reason.
- 9. The surface tension of a soap solution is 0.03 Nm⁻¹. How much work is done in producing soap bubble of radius 0.05 m

MARCH 2020

- 1. Check the correctness of the equation $\frac{1}{2}$ mv² = mgh using dimensional analysis.
- 2. Define distance and displacement.
- 3. Why there is no lunar eclipse and solar eclipse every month?
- 4. State the law of conservation of angular momentum.
- 5. What is coefficient of restitution?
- During a cyclic process, a heat engine absorbs 500 J of heat from a hot reservoir, does work and ejects an amount of heat 300 J into the surroundings (cold reservoir). Calculate the efficiency of the heat engine.
- 7. Why there is no hydrogen in the earth's atmosphere?
- 8. Write down the factors affecting velocity of sound in gases.
- 9. If the length of the simple pendulum is increased by 44% from its original length, calculate the percentage increase in time period of the pendulum.

SEPTEMBER 2020

- 1. What are fundamental quantities? Give an example.
- 2. The position vector and angular velocity vector of a particle executing uniform circular motion at an instant are $2\hat{i}$ and $4\hat{k}$ respectively. Find its linear velocity at that instant.
- 3. When walking on ice one should take short steps. Why?
- 4. What is radius of gyration?
- 5. State Newton's Universal Law of Gravitation.
- 6. Explain red shirt and blue shift in Doppler effect.
- 7. What is P-V diagram?
- 8. List the factors affecting the mean free path.
- A metal cube of side 0.20 m is subjected to a shearing force of 4000 N. The top surface is displaced through 0.50 cm with respect to the bottom. Calculate the shear modulus of elasticity of the metal.

AUGUST 2021

- 1. Define angular velocity.
- 2. State Wien's law.
- 3. Check the correctness of the equation v=u+at using dimensional analysis method.
- 4. Give any two examples of torque in day-to-day life.
- 5. Define frequency of simple harmonic motion.
- 6. A book of mass m is at rest on the table. Draw the free body diagram for the book.
- 7. Compute the distance between anti-node and neighbouring node.
- 8. Why the energy of a satellite or any other planet is negative?
- Calculate the energy consumed in electrical units when a 75 W fan is used for 8 hours daily for one month (30 days).

<u>MAY 2022</u>

- 1. What is Reynold's number?
- 2. Define the term 'degrees of freedom'.
- 3. In a submarine equipped with sonar, the time delay between the generation of a pulse and its echo after reflection from an enemy submarine is observed to be 80 5. If the speed of sound in water is 1460 ms⁻¹, what is the distance of enemy submarine?
- 4. State Wien's Displacement Law.
- 5. Define gravitational potential.
- 6. What is simple harmonic motion?
- 7. State Newton's second law.
- 8. State conservation of angular momentum.
- 9. A particle moves along the x-axis in such a way that its coordinates x varies with time 't' according to equation x=2--5t+6t?. What is the initial velocity of the particle?

AUGUST 2022

- 1. Write any two limitations of dimensional analysis?
- 2. What is meant by Escape speed in the case of the Earth?
- 3. A mobile phone tower transmits a wave signal of frequency 900 MHz. Calculate the length of the waves transmitted from the mobile phone tower.
- 4. State Stefan Boltzmann Law.
- 5. Define Centre of mass.
- 6. What is meant by periotic and non-periodic motion?
- 7. State Hooke's Law of Elasticity.
- 8. Define Inertia.
- 9. Consider two trains A and B moving along parallel tracks with same velocity in the same direction. Let the velocity of each train be 50 km / hr due east. Calculate the relative velocities of the trains.

MARCH 2023

- 1. Write the rules for determining significant figures.
- 2. Define scalar. Give examples.
- 3. Under what condition will a car skid on a levelled circular road?
- 4. Write any two differences between conservative and non-conservative Force.
- 5. What are the conditions in which Force cannot produce Torque?
- 6. State Newton's Universal Law of Gravitation.
- 7. Define Poisson's ratio.
- 8. State Zeroth Law of Thermodynamics.
- Two objects of masses 3 kg and 6 kg are moving with the same momentum of 30kgms⁻¹. Will they have same kinetic energy?

JUNE 2023

- 1. What is the principle of homogeneity of dimensions?
- A metal cube of side 0.20 m is subjected to a shearing force of 4000 N. The top surface is displaced through 0.50 cm with respect to the bottom. Calculate the shear modulus of elasticity of the metal.
- 3. What is the meaning of 'pseudo force'?
- During a cyclic process, a heat engine absorbs 500 J of heat from a hot reservoir, does work and ejects an amount of heat 300 J into the surroundings (cold reservoir). Calculate the efficiency of the heat engine.
- 5. What is the difference between velocity and average velocity?
- 6. Why there is no lunar eclipse and solar eclipse every month?
- 7. Mention the four different types of oscillations.
- 8. State the law of equipartition of energy.
- 9. A fly wheel rotates with a uniform angular acceleration. If its angular velocity increases from $20\pi \text{ rad/s to } 40\pi \text{ rad/s in } 10 \text{ seconds}$. Find the number of rotations in that period.

MARCH 2019

- 1. What is the torque of the force $\vec{F} = 3\hat{i} 2\hat{j} + 4\hat{k}$ acting at a point $\vec{r} = 2\hat{i} + 3\hat{j} + 5\hat{k}$ about the origin?
- 2. What are the various of friction? Suggest few methods to reduce friction.
- 3. A heavy body and a light body have same momentum. Which one of them has more kinetic energy and why?
- 4. Find the rotational kinetic energy of a ring of mass 9 kg and radius 3m rotating with 240 rpm about an axis passing through its centre and perpendicular to its plane.
- 5. What do you mean by the term weightlessness? Explain the state of weightlessness of a freely falling body.
- 6. Derive an expression for the terminal velocity of a sphere falling through a viscous liquid.
- 7. Explain linear expansion of solid.
- 8. Write down any six postulates of kinetic theory of gases.
- Two waves of wavelength 99 cm and 100 cm both travelling with the velocity of 396 ms⁻¹ are made to interfere. Calculate the number of beats produced by them per sec.

MARCH 2020

- 1. Explain RADAR pulse method for determining large distances.
- An object is thrown with initial speed 5ms⁻¹ with an angle of projection 30°.
 Calculate the maximum height reached and the horizontal range.
- 3. When a cricket player catches the ball, he pulls his hands in the direction of the ball's motion. Why?
- 4. State Kepler's three laws.
- 5. Write the differences between transverse and longitudinal waves.
- 6. We use straw to suck soft drinks. Why?
- 7. Explain Resonance. Give an example.
- 8. What are the conditions for reversible process?
- 9. A force of $(4\hat{\imath} 3\hat{\jmath} + 5\hat{k})$ N is applied at a point whose position vector is $(7\hat{\imath} + 4\hat{\jmath} 2\hat{k})$ m. Find the torque of force about the origin.

SEPTEMBER 2020

- 1. Write about dimensional variables and dimensionless variables with an example.
- 2. A train was moving at the rate of 54 kmh⁻¹ when brakes were applied. It came to rest within a distance of 225 m. Calculate the retardation produced in the train.
- 3. Compare elastic and inelastic collisions.
- 4. Derive an expression for kinetic energy of a rigid body in rotational motion.
- 5. Suppose we go 200 km above and below the surface of the Earth, what are the g values at these two points? In which case, is the value of g small?
- 6. Write any three applications of Surface Tension.
- 7. Why does heat flow from a hot object to cold object?
- 8. Write any six postulates of kinetic theory of gases.
- 9. Calculate the amplitude, angular frequency, frequency, time period and initial phase of the simple harmonic oscillation for the given equation

 $y = 0.3 \sin (40\pi t + 1.1).$

AUGUST 2021

- 1. Derive the relation between Momentum and Kinetic energy.
- 2. State the law of transverse vibrations in stretched strings.
- 3. Show that in horizontal projection, the path of a projectile is a Parabola.
- 4.. Define centre of gravity.
- 5. State Stefan-Boltzmann Law.
- 6. What are the salient features of Static and Kinetic friction?
- 7. What are the applications of Dimensional Analysis?
- 8. Define the degrees of freedom. Give an example.
- 9. If excess pressure is balanced by a column of oil with specific gravity 0.8, 4 mm high, where R=2.0 cm, find the surface tension of the soap bubble.

MAY 2022

- 1. Compare Elastic and Inelastic collision.
- 2. Discuss the Law of Transverse Vibrations in stretched strings.
- 3. Using free body diagram, show that whether it is easy to pull an object than to' push it.
- 4. What are the resultants of the vector product of two vectors given by

 $\vec{A} = 4\hat{\imath} - 2\hat{\jmath} + \hat{k}$ and $\vec{B} = 5\hat{\imath} + 3\hat{\jmath} - 4\hat{k}$?

- 5. Write a short note on polar satellites.
- 6. Give any three applications of viscosity.
- 7. Define torque. Give any two examples of torque in day-to-day life.
- 8. What is meant by periodic and non-periodic motion? Give any two examples, for each motion.
- 9. A person docs 30 kJ work on 2 kg of water by stirring using a paddle wheel. While stirring, around 5 kcal of heat is released from water through its container to the surface and surroundings by thermal conduction and radiation. What is the change in internal energy of the system?

AUGUST 2022

- 1. State Newton's three laws of motion.
- An electron of mass 9.1 x 10⁻³¹ kg revolves around a nucleus in a circular orbit of radius 0.53Å. What is the angular momentum of the electron? (Velocity of electron v=2.2 x 10⁶ ms⁻¹)
- 3. Distinguish between streamlined flow and turbulent flow.
- 4. What is meant by Gross Error? How shall we minimize it?
- 5. Derive an expression for Energy of Satellite.
- 6. Show that path of a projectile is a parabola in horizontal projection.
- 7. Derive the relation between momentum and kinetic energy.
- 8. State the laws of Simple Pendulum.
- During a cyclic process, a heat engine absorbs 500 J of heat from a hot reservoir, Does work and ejects an amount of heat 300 J into the surroundings (cold reservoir). Calculate the efficiency of the heat engine

MARCH 2023

- 1. What is Gross Error? State the reasons for it and how to minimize the errors.
- 2. Write the properties of scalar product of two vectors.
- 3. State the differences between centripetal force and centrifugal force.
- 4. State the various types of potential energy. Explain its formulae.
- 5. Explain geostationary satellites.
- 6. Write the practical applications of capillarity.
- 7. State the Laws of Simple Pendulum.
- 8. Write down the postulates of kinetic theory of gases.
- During a cyclic process, a heat engine absorbs 600 J of heat from a hot reservoir, does work and ejects an amount of heat 200 J into the surroundings (cold reservoir). Calculate the efficiency of the heat engine.

JUNE 2023

- 1. Write a note on triangulation method to measure larger distances.
- 2. Define "molar specific heat capacity". Give its unit.
- 3. Write the various types of potential energy.
- 4. State the laws of transverse vibrations in stretched strings.
- A car takes a turn with velocity 50 ms⁻¹ on the circular road of radius of curvature 10 m. calculate the centrifugal force experienced by a person of mass 60 kg inside the car?
- 6. What are the differences between sliding and slipping?
- 7. A train was moving at the rate of 54 km h⁻¹ when brakes were applied. It came to rest within a distance of 225 m. Calculate the retardation produced in the train.
- 8. What are the factors affecting the surface tension of a liquid?
- 9. Ten particles are moving at the speed of 2, 3, 4, 5, 5, 5, 6, 6, 7 and 9 m s⁻¹.
 Calculate root mean square speed (V_{rms}) and most probable speed (V_{mp}).

MARCH 2019

(a) Explain the principle of homogeneity of dimensions and derive an expression for the force F acting on a body moving in a circular path depending on the mass of the body (m), velocity (v) and radius (r) of the circular path. Obtain the expression for the force by the dimensional analysis method (take the value k = 1).

(OR)

- (b) State and prove Bernoulli's Theorem for a flow of incompressible, non-viscous and streamlined flow of liquid.
- (a) Prove the law of conservation of momentum. Use it to find the recoil velocity of a gun when a bullet is fired from it.

(OR)

- (b) State and prove parallel axes theorem.
- 3. (a) What is elastic collision? Derive an expression for final velocities of two bodies which undergo elastic collision in one dimension.

(OR)

- (b) How will you determine the velocity of sound using resonance air column apparatus?
- 4. (a) Derive the Mayer's relation for an ideal gas.

(OR)

- (b) Explain the horizontal oscillations of a spring.
- 5. (a) (i) Write down the equation of a freely falling body under gravity.
 - (ii) A ball is thrown vertically upwards with the speed of 19.6 ms⁻¹ from the top of a building and reaches the earth in 6 s. Find the height of the building.

(OR)

- (b) (i) Define orbital velocity and establish an expression for it.
 - (ii) Calculate the value of orbital velocity for an artificial satellite of earth orbiting at a height of 1000 km (Mass of the earth = $6x10^{24}$ kg, radius of the earth = 6400 km).

MARCH 2020

1. (a) Derive the expression for centripetal acceleration.

(OR)

- (b) State and explain work energy theorem. Mention any three examples for it.
- (a) What do you mean by propagation of errors? Explain propagation of errors in division of two quantities.

(OR)

- (b) Derive the work done in an adiabatic process.
- 3. (a) (i) Derive the expression for the variation of acceleration due to gravity (g) with depth from the surface of the earth (d).
 - (ii) Find the ratio of the acceleration due to gravity at a height R/2 from the surface of the earth to the value at a depth R/2 from the surface of the earth (R – radius of the earth).

(OR)

- (b Explain bending of cyclist in curves and arrive at an expression for angle of bending.
- 4. (a) Derive the expression for moment of inertia of a thin uniform rod about an axis passing through the centre and perpendicular to its length.

(OR)

- (b) Explain in detail the four different types of oscillations.
- 5. (a) (i) Determine the height of an accessible object using Triangulation method.
 - (ii) From a point on the ground, the top of a tree is seen to have an angle of elevation 60°. The distance between the tree and a point is 50 m.
 Calculate the height of the tree.

(OR)

(b) Derive the expression for the terminal velocity of a sphere moving in a high viscous fluid, using Stoke's formula.

SEPTEMBER 2020

1. (a) Prove the law of conservation of linear momentum. Use it to find the recoil velocity of a gun when a bullet is fired from it.

(OR)

- (b) What is meant by angular harmonic oscillation? Derive an expression for the time period of angular harmonic oscillation.
- 2. (a) (i) What are the applications of dimensional analysis?
 - Express 76 cm of mercury pressure in terms of Nm⁻² using the method of dimensions.

(OR)

- (b) (i) Obtain a relation between momentum and kinetic energy.
 - Two objects of masses 2 kg and 4 kg are moving with same momentum of 20 kgms⁻¹.
 - (A) Will they have same kinetic energy?
 - (B) Will they have same speed?
- 3. (a) Derive the linear kinematic equations of motion for constant accelerated motion.

(OR)

- (b) Explain the types of equilibrium with suitable examples.
- 4. (a) What is thermal expansion? Explain the three types of thermal expansion and obtain the relation between them.

(OR)

- (b) What are stationary waves? Explain the formation of stationary waves.
- 5. (a) Derive an expression for Orbital Velocity and Time Period of the satellite.

(OR)

(b) Derive Poiseuille's formula for the volume of a liquid flowing per second through a pipe under stream lined flow.

AUGUST 2021

1. (a) Explain the oscillations of liquid column in U-tube.

(OR)

- (b) Derive the kinematics equations of motion for constant acceleration.
- 2. (a) State and explain work energy principle.

(OR)

- (b) Explain how overtones are produced in a closed organ pipe.
- (a) Convert 76 cm of mercury pressure into Nm⁻² using the method of dimensions.

(OR)

- (b) Explain in detail Newton's law of cooling.
- 4. (a) State and Prove Bernoulli's theorem.

(OR)

- (b) Derive an expression for Kinetic Energy in Rotation.
- 5. (a) Explain the need for banking of tracks.

(OR)

(b) Explain the variation of g with depth from the Earth's surface.

MAY 2022

- 1. (a) (i) Write the applications of the Dimensional Analysis.
 - (ii) Check the correctness of the equation $\frac{1}{2}$ mv²= mgh using Dimensional analysis method.

(OR)

- (b) Obtain an expression for the surface tension of a liquid by capillary rise method.
- 2. (a) State and explain equipartition of energy.

(OR)

- (b) Derive the kinematic equations of motion for constant acceleration.
- 3. (a) Explain the motion of blocks connected by a string in vertical motion.

(OR)

- (b) Explain the variation of acceleration due to gravity (g) with altitude.
- 4. (a) Explain the horizontal oscillations of a spring.

(OR)

- (b) State and explain work-kinetic energy theorem. Discuss the inferences of work-kinetic energy theorem.
- 5. (a) Discuss rolling on inclined plane and arrive at the expression for the acceleration.

(OR)

(b) Explain how overtones are produced in a closed organ pipe.

AUGUST 2022

1. (a) Derive an expression for moment of Inertia of a rod about its centre and perpendicular to the axis of the rod.

(OR)

- (b) What is a Sonometer? Give its construction and working. Explain how to determine the frequency of tuning fork using Sonometer.
- (a) What is Inelastic collision? Derive an expression for loss of kinetic energy in perfect inelastic collision.

(OR)

- (b) Explain in detail the kinetic interpretation of temperature.
- 3. (a) Explain in detail about the Newton's Law of cooling.

(OR)

- (b) Describe the method of measuring angle of repose.
- 4. (a) Explain in detail the Triangle Law of Vector Addition.

(OR)

- (b) Derive Poiseuille's formula for the volume of a liquid flowing per second through a pipe under streamlined flow.
- 5. (a) Write a note on Triangulation method and radar method to measure larger distances.

(OR)

(b) Explain the variation of 'g' with depth from the Earth's surface.

MARCH 2023

- 1. (a) Obtain an expression for the time period T of a simple pendulum. The time period depends on :
 - (i) mass 'm' of the bob
 - (ii) length 'l' of the pendulum and
 - (iii) acceleration due to gravity 'g' at the place where the pendulum is suspended. (Constant $k = 2\pi$)

(OR)

- (b) Explain in detail the Triangle Law of Vector Addition.
- 2. (a) Show that in an inclined plane, angle of friction is equal to angle of repose.

(OR)

- (b) Derive an expression for power and velocity
- (a) Derive the expression for moment of inertia of a rod about its centre and perpendicular to the rod.

(OR)

- (b) Explain the variation of Acceleration due to gravity (g) with depth from the earth's surface.
- 4. (a) Derive the expression for the terminal velocity of a sphere moving in a high viscous fluid using Stoke's law.

(OR)

- (b) Derive Meyer's relation for an ideal gas.
- 5. (a) Derive the expression of pressure exerted by the gas molecules on the walls of the container.

(OR)

(b) Derive Newton's formula for velocity of sound waves in air. Explain the Laplace's correction in it.

JUNE 2023

1. (a) What is an error? Explain the systematic errors.

(OR)

- (b) State and prove Bernoulli's theorem for a flow of incompressible, non-viscous and streamlined flow of liquid.
- 2. (a) Discuss in detail the energy in simple harmonic motion

(OR)

- (b) State Newton's three laws and discuss their significance.
- 3. (a) State and explain work energy principle.

(OR)

- (b) Derive an expression for escape speed.
- 4. (a) Explain in detail the working of a refrigerator.

(OR)

- (b) Derive the kinematic equations of motion for constant acceleration.
- 5. (a) How will you determine the velocity of sound using resonance air column apparatus?

(OR)

(b) State and prove parallel axis theorem.