<u> </u>	VIVEKAN	IANDA COLL	EGE, TIRUVEDAI	<u> KAM WEST - 625</u>	5234	
		DSo Mothol				
TOTO	Course Code:	06AE02	Programme:	Chemistry	CIA:	Ι
	Date:	25.01.2023	Part:	III	Semester:	II
LAND HEAT	Duration:	2 Hours	Academic Year:	2022-23	Max. Marks:	50
	Study Compo	nent:	Ability Enhancer	nent Course	I	
	Course Title:	ALLIED PHY	YSICS - II			
		SECT	ION A (Domombo	rin a)		
Answer	ALL the Ouestions.	SECI	ION – A (Keineinde	ring)	$(10 \times 1 = 10 \text{ Ma})$	rks)
1	The relation between	the path and ph	ase difference is given	n bv		1
-	a)Phase difference =	$4\pi / \lambda \times \text{path dif}$	fference			-
	b) Phase difference =	= $3\pi / \lambda \times$ path d	lifference			
	c)Phase difference =	$\pi / \lambda \times$ path dif	ference			
	d) Phase difference =	= 2π / λ × path d	lifference			
2	The condition for bri	$\frac{1}{2}$ by 1	eflected system is		CO	1
-	a) $2nt \cos r = (2m + 1)$	$\lambda/2$ b) 2	$2nt \sin r = (2m + 1) \lambda$	/ 2		-
	c) $2nt \cos r = (2m + 1)$	$\lambda/4$ d) 2	$2nt \cos r = (2m + 1) \lambda$	/ 6		
3	The phenomenon of	bending of light	waves around corner	s and their spreading	g CO	1
	into the geometrical s	shadow of an obj	ject is called	1 0		
	a)Interference b) Po	olarization c) D	iffraction d) Reflection	on		
4	The unit of specific 1	otatory power is	5		CO	1
	a) deg.dm ⁻¹ (gm/cc) ⁻¹	¹ b) deg.dm ⁻¹ ($\frac{1}{2}$	$gm/cc)^{-2}$ c) deg.dm ⁻¹	$(gm/cc)^{-3}$ d)deg.dm ⁻¹	$(gm/cc)^{-4}$	
5	The space in between	n any two lines i	s transparent to		CO	1
	a)Sound b) Light	t c) Velocity	d) Frequency			
6	The points in the cor	secutive slits sep	parated by the distanc	e is	CO	1
	a) a/b b) a×	b c) a + b	d) a - b			
7	The film appears dar	k is			CO	1
	a) $2ntcosr = m\lambda$ b)) $2ntsinr = m\lambda$	c) $2ntcotr = m\lambda$ d) λ	2 ntcosr = λ		
8	Isotopes have same i	number of protor	ns but different numbe	er of	CO	2
	a) electrons b)	neutrons c)	shells d) positrons	5		
9	The size of the atom	is of the order o	f		CO	2
4.0	a) 10^{-14} m b) 10^{-14}	$^{\circ}m$ c) $10^{\circ}m$	d) 10^{-6} m			-
10	The vector atom mo	del is an extensio	on of		CO	2
	a) Bohr atom model	1 / 1 1	b) Rutherford atom r	nodel		
	c) Bonr- Sommerfeld	a atom model	a) none of these			
Anome	ony FIVE Quartiana	. SECI	IUN – B (Kemembe	ring)	(5 V) - 10 Max	nka)
Answer	What is diffraction of	rating?			$(3 \mathbf{A} 2 = 10 \mathbf{Ma})$	1 KS) 1
11	Compare between Fi	resnel and Fraun	hofer diffraction			т 1
12	What is interference	9			CO CO	- 1
13	Define specific rotat	or power			CO CO	- 1
17		or po	1 (1) .		μ ⁰	-

15 Calculate the specific rotation if the plane of polarization is turned through 26.4⁰, traversing CO1 20cm length of 20% sugar solution.

16Give the two concepts of vector atom modelCO217Write the maximum number of electrons in the K, L, M, N and O shellCO2

SECTION – C (Understanding)

Answer	any THREE Questions: (3 X 6= 1	8 Marks)
18	Differentiate between Interference and diffraction.	CO1
19	Describe the theory of working of plane transmission grating.	CO1
20	A Parallel beam of sodium light ($\lambda = 589 \times 10^{-9}$ m) is incident on a thing glass plate	CO1
	$(n=1.5)$ such that the angle of refraction into the pate is 60° . Calculate the smallest thickness	
	of the plate which will make it appear dark by reflection.	
21	Explain the spatial quantization and spinning electron.	CO2
22	State and explain the Pauli Exclusion principle.	CO2

SECTION – D (Applying)

Answer	any ONE Question:	(1X 12= 12 Marks)
23	Explain the phenomenon of interference due to reflected light on thin films.	CO1
24	Explain in detail about the quantum numbers associated with the vector atom mode	el. CO2
	&&&&&	

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234

	DEPARTMENT OF PHYSICS					
	Course Code:	06CT21	Programme:	B.Sc. Physics	CIA:	Ι
	Date:	20.01.2023	Part:	III	Semester:	II
	Duration:	2 Hours	Academic Year:	2022-23	Max. Marks:	50
HAND HEARD HEAD	Study Compor	nent:	Core Course			
	Course Title:	THERMODY	NAMICS AND ST	ATISTICAL MEC	HANICS	

SECTION – A (Remembering)

Answer	ALL the Questions:	(10 X 1 = 10 Marks)
1	The heat is absorbed by a	CO1
	a) condenser b) evaporator c) compressor d) thermostat	
2	The body which absorbs all radiations incident upon it, is called as	CO1
	a) Black body b) white body c) opaque body d) transparent body	
3	Unit of thermal conductivity is	CO1
	a) J/kg.K b) J/mol.K c) J.ohm/sec. K^2 d) W/m.K	
4	Which of the following has least value of thermal conductivity?	CO1
	a) glass b) water c) air d) plastic	
5	Emissivity of a white polished body in comparison to a black body is	CO1
	a) higher b) lower c) same d) depends upon the shape of b	ody
6	The value of the wavelength for maximum emissive power is given by	CO1
	a) Wien's law b) Planck's law c) Stefan's law d) Fourier's law	
7	Newton's law of cooling is a special case of	CO1
	a) Wien's law b) Stefan's law c) Kirchhoff's law d) Planck's law	
8	Value of Van der Waals constant 'a' increases with increase in	CO2
	a) pressure b) volume c) intermolecular forces d) temperature	
9	Joule Thomson effect describes gases	CO2
	a) contraction b) sudden expansion c) expansion d) relaxation	
10	In Porous plug experiment the change in temperature of a gas depends upon	CO2
	a) its molecular weight b) its specific heat c) pressure gradient on a	either side
	d) all of the above	

SECTION – B (Remembering)

Answer	any FIVE Questions:	(5 X 2 = 10 Marks)
11	Differentiate between conduction and convection.	CO1
12	Define coefficient of thermal conductivity.	CO1
13	Define the term thermal diffusivity.	CO1
14	State Weidmann-Franz law.	CO1
15	Define solar constant.	CO1
16	What is a critical point?	CO2
17	Define critical temperature.	CO2

SECTION – C (Understanding)

	Shorion o (chadistanding)	
Answer	T any THREE Questions: $(3 \times 6 = 18 \text{ M})$	larks)
18	State Stefan-Boltzmann law of radiation and prove it from thermodynamic considerations.	CO1
19	Discuss the distribution of energy in the spectrum of a black body on the basis of the	CO1
	spectrum obtained in the experiment performed by Lummer and Pringsheim.	

- 20 The opposite faces of a metal plate of 0.2 cm thickness are at a difference of temperature CO1 of 100 ° C and the area of the plate is 200 sq.cm. Find the quantity of the heat that will flow through the plate in one minute if K = 0.2 CGS units.
- 21 Describe porous plug experiment. What conclusions have been drawn from it? CO2
- 22 Calculate the Van der Waals constants for dry air, given that $T_c = 132$ K, $P_c = 37.2$ CO2 atmospheres and R per mole = 82.07 cm³ atmos K⁻¹.

SECTION – D (Applying)

Answer any **ONE** Question:

(1 X 12 = 12 Marks)

- 23 Discuss in detail Forbes method for finding the coefficient of thermal conductivity of a metal bar.
- 24 Derive Van der Waals equation of state and use it to obtain the expressions for the critical CO2 constants in terms of the constants of the Van der Waals equation.

	VIVEKAN	ANDA COLLI	EGE, TIRUVEDAP	KAM WEST - 625	234	
~~	DEPARTMENT OF PHYSICS					
	Course Code:	06CT22	Programme:	B.Sc. Physics	CIA:	Ι
	Date:	24.01.2023	Part:	III	Semester:	II
	Duration:	2 Hours	Academic Year:	2022-23	Max. Marks:	50
LIAND THEARD HEAD.	Study Compor	nent:	Core Course			
	Course Title:	OPTICS ANI	D SOUND			

SECTION – A (Remembering)

Answei	rALL the Questions: (1	0 X 1 = 10 Marks)
1	The phase difference for constructive interference	CO1
	a) 0, 2 π , 4 π b) π , 3 π , 5 π c) 0, $\pi/2$, π , 3 $\pi/2$ d) zero	
2	The refractive index of water is	CO1
	a) 1.00 b) 1.45 c) 1.50 d) 1.33	
3	The separation between adjacent maxima in interference pattern is	CO1
	a) $\frac{\lambda D}{d}$ b) $\frac{\lambda d}{D}$ c) $\frac{D}{\lambda d}$ d) $\frac{d}{\lambda D}$	
4	The equation $f = f_{c_1} \sqrt{1 - \frac{u^2}{c^2}}$ states that Doppler effect	CO1
	a) longitudinal b) transverse c) coherent d) zero	
=	The phase mlationship between two wowes does not shore with time is called	001
5	The phase relationship between two waves does not change with time is called	COI
	a)coherence b) interference c)polarisation d) diffraction	
6	Constructive interference happens when two waves are	CO1
	a) out of phase b) zero amplitude c) in phase d) in front	
7	A device that can be used to measure change in length with great accuracy by mean	s of CO1
	interference fringes	
	a) Polarimeter b) Interferometer c) microscope d) spectrometer	
8	The bending or spreading of waves that encounter an object in their path is called	CO2
	a) interference b) diffraction c) polarization d) refraction	
9	The intensity in single slit diffraction is $I_{\theta} =$	CO2
	a) $I_m (\sin \alpha/\alpha)^2$ b) $I_m (\cos \alpha/\alpha)^2$ c) $I_m (\tan \alpha/\alpha)^2$ d) $I_m (\sin \alpha/\alpha)$	
10	Each part of hologram contains information about	CO2
	a) entire object b) particular part of the object	
	c) important part of the object d) front side of the object	
	SECTION – B (Remembering)	
Answei	r any FIVE Questions:	5 X 2 = 10 Marks)
11	Define the term interference	CO1
12	Define destructive interference	CO1
13	State Doppler effect	CO1

14	What is coherence?	CO1
15	What is an interferometer?	CO1
16	Define resolving power of the grating.	CO2
17	State Bragg's law.	CO2
	SECTION – C (Understanding)	
Answer	any THREE Questions: (3 X 6= 18	8 Marks)
18	Explain the phenomenon of total internal reflection	CO1
19	Derive the relation for relativistic Doppler effect	CO1
20	The double slit arrangement is illuminated with light from a mercury vapour lamp filtered	CO1
	so that only the strong green line ($\lambda = 546$ nm) is visible. The slits are 0.12 mm apart, and	
	the screen on which the interference pattern appears is 55 cm away. (a) What is the angular	
	position of the first minimum? Of the tenth maximum? (b) What is the distance on the	
	screen between the adjacent maxima?	
21	Write a note on holography.	CO2
22	Distinguish between Fresnel and Fraunhofer diffraction.	CO2
	SECTION – D (Applying)	
Answer	anyONE Question: (1X 12= 12	2 Marks)
23	Describe the theory of double slit inference with suitable diagrams	CO1
24	Explain the production of X-rays and the use of X-ray diffraction in sodium chloride	CO2
	structure analysis.	

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234

		DEPARTI	MENT OF PHYSIC	cs		
~~~	Course Code:	06CT41	Programme:	B.Sc. Physics	CIA:	Ι
	Date:	20.01.2023	Part:	III	Semester:	IV
	Duration:	2 Hours	Academic Year:	2022-23	Max. Marks:	50
HAND HEART HEAD	Study Compor	nent:	Core Course		·	1
	<b>Course Title:</b>	ANALOG EL	ECTRONICS			
1	1	-				
<b>A</b>	ATT the Oresting		SECTION – A	1-		)
Answer	ALL the Questions	formul accietor	as of the order of	(.	$10 \times 1 = 10 \text{ Mark}$	(S) 1
1	A crystal uloue has $a > k O$	b) O	c) MO	d) mO	CO	I
2	a = 1	$0) \le 2$	· · · · · 1	u) 1152	<b>CO</b>	1
2	The knee voltage of	t a crystal diode	is approximately equa	al to	CO	I
2	a) applied voltage	b) breakdowi	n voltage c) forward v	voltage d) barrier po	otential	1
3	A crystal diode is u	b) a reatific		or d) a voltaga	ragulator	I
	a) an ampimer	b) a recurre	er c) an oscillat	or d) a voltage	regulator	
4	When the crystal di	iode current is la	rge, the bias is	••••	CO	1
~	a) forward	b) inverse	c) poor	d) reverse	<b>C</b> O	
5	A Zener diode is us		1			I
	a) an amplifier	b) a voltage i	regulator c) a i	rectifier d) a multivi	brator	
6	The ripple factor of	f a half – wave re	ectifier is	•••••	CO	1
_	a) 2	b) 1.21	c) 2.5	d) 0.48		
7	The maximum effic	ciency of a half -	- wave rectifier is		СО	1
	a) 40.6%	b) 81.2%	c) 50%	d) 25	5%	-
8	A transistor has	• • • • • •			CO	2
	a) one <i>pn</i> junction	b) two <i>pn</i> junc	c) three <i>p</i>	<i>n</i> junction d) four <i>pn</i>	junction	
9	The input impedance	ce of a transistor	is		CO	2
	a) high	b) low	c) very high	d) almost zero		
10	In a transistor,	•••••			CO	2
	a) $I_c = I_E + I_B$	b) $I_B = I_C + I_C$	$I_E$ c) $I_E = I_C - I_C$	$I_{\rm B} \qquad \qquad d)  I_{\rm E} = I_{\rm C} +$	· I _B	
			SECTION – B			``
Answer	any <b>FIVE</b> Question	is:			(5 X 2 = 10 Mark	(S) 1
11	Define ripple factor	r. Jag				1
12	What is a zener dio	teges of full way	va bridga raatifiar?			1
13	Define peak inverse	ages of full way	e blidge lectifiel?			1
14	What is filter circuit	e vonage.				1
15	Draw the symbol for	or NPN transisto	r and PNP transistor			2
10	Define O-point of a	transistor				2
17	Denne & point of t		SECTION – C		00	-
Answer	anv <b>THREE</b> Ouest	ions:			(3 X 6= 18 Mark	(S)
18	Derive an expression	on for the efficie	ncy of a half wave rec	tifier and find its value	e. CO	1
19	Compare the differ	ent rectifier circu	uits.		СО	1
20	Explain how zener	diode act as volt	age stabilizer?		СО	1
21	In a CE transistor of	circuit, $V_{CC} = 12$	$2V$ and $R_{C} = 6k\Omega$ , drav	w the d.c. load line. W	/hat will be <b>CO</b>	2
	the Q point if zero s	signal base curre	ent IB is $20\mu A$ and $\beta =$	=50?		
22	Explain the following	ing terms of a tr	ansistor i) current ga	in ii) voltage gain and	d iii) power CO	2
	gain.					
			SECTION – D			
Answer	any ONE Question	:			(1X 12= 12 Mark	(s)
23	Explain the workin	g of full wave bi	ridge rectifier with nea	at circuit diagram.	CO	1
24	Describe a transisto	or as an amplifier	r in CE arrangement.		CO	2
			&&&&&&&			

	VIVEKAN	IANDA COLL	EGE, TIRUVEDAF	KAM WEST - 625	6234	
		DEPARTI	MENT OF PHYSIC	S		
TUTT	<b>Course Code:</b>	06CT42	Programme:	B.Sc. Physics	CIA:	Ι
	Date:	24.01.2023	Part:	III	Semester:	IV
	Duration:	2 Hours	Academic Year:	2022-23	Max. Marks:	50
	Study Compo	nent:	Core Course			
	<b>Course Title:</b>	NUMERICA	L METHODS			

#### SECTION – A

Answer All the questions:	10 X 1 = 10 Marks
1. $f(x) = 2x^3 - 9x^2 + 12x + 6$ is a polynomial of degree a) two b) three c) one d) four	C01
2. $f(x) = a + be^{x} + c \sin x + d \log x$ is an example of a) algebraic equation b) polynomial equation c) transcendental equation	cO1 d) linear equation
<ul><li>3. Find the odd one out</li><li>a) Bisection method b) Bolzano's method c) Interval halving method d) Regulation</li></ul>	CO1 ula-Falsi method
<ul><li>4. Newton Raphson method is also called</li><li>a) Method of tangents</li><li>b) Method of Chords</li><li>c) Bisection method</li></ul>	d) All the above
5. In the Regula – False method we approximate the curve of the function $f(x)$ by a) Tangent b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Normal d) Pair of the function $f(x)$ b) Chord c) Pair of the function $f(x)$ b) Pair of the function $f(x)$ b) Chord c) Pair of the function $f(x)$ b) Chord c) Pair of the function $f(x)$ b) Chord c) Pair of the function $f(x)$ b) Pair of the funct	by a CO1 of tangents
<ul><li>6. Bisection method is also known as</li><li>a) Regular false method b) Bolzano method c) Method of false position</li></ul>	<b>CO1</b> d) Method of tangents
7. Choose the transcendental equation from the following a) $x^3 - 1 = 0$ b) $x^2 + x + 1 = 0$ c) $x = 1$ d) $e^x - 1$	<b>CO1</b>
<ul><li>8. In Gauss-Elimination method the given matrix is converted in to</li><li>a) unit matrix</li><li>b) upper triangular matrix</li><li>c) null matrix</li><li>d) lower</li></ul>	CO2 triangular matrix
<ul><li>9. The fastest method of solving Simultaneous Linear Algebraic equation is</li><li>a) Gauss-Elimination method b) Gauss-Jordan method c) Gauss-Seidal method</li></ul>	CO2 hod d) All the above
10. Gauss elimination and Gauss Jordan methods area) iterativeb) interpolationc) directd) indirect	CO2
GEOTION D	

#### SECTION – B

Ans	swer any FIVE Questions:	5 X 2 = 10 Marks
11.	Why do we adopt numerical methods to solve algebraic and transcendental equation	ons? CO1
12.	Give an example for transcendental equation.	CO1
13.	State the fundamental theorem from the theory of equations.	CO1
14.	What is the disadvantage of Bisection method?	CO1
15.	Write down the iterative formula of Newton-Raphson method.	CO1

- 16. What do you mean by Simultaneous Linear Algebraic Equations?
- 17. What are the two numerical methods used in solving Simultaneous Linear Algebraic Equations? CO2

#### **SECTION – C**

Answer any THREE Questions:	3 X 6 = 18 Marks
18. Find the positive root of $x$ -cos $x = 0$ by bisection method.	CO1
19. Find the real root of the equation $\cos x = 3x-1$ correct to 4 decimal places by iteration me	thod. CO1
20. Find a positive root of $x e^{x} = 2$ by the method of False position.	CO1
21. Solve the system of equations by Gauss-Elimination method	CO2
x + 2y + z = 3	
$2\mathbf{x} + 3\mathbf{y} + 3\mathbf{z} = 10$	
3x - y + 2z = 13	
22. Solve by Gauss-Elimination method	CO2
2x + 3y - z = 5	
4x + 4y - 3z = 3	
2x - 3y + 2z = 2	

#### **SECTION – D**

#### Answer any ONE Question:

23. Find the real positive root of  $3x-\cos x-1 = 0$  by Newton's method correct to 6 decimal places. **CO1** 24. Solve by Gauss-Elimination method **CO2** 

3x + 4y + 5z = 182x - y + 8z = 135x - 2y + 7z = 20

&&&&&&&

**CO2** 

1 X 12 = 12 Marks

	VIVEKAN	ANDA COLL	EGE, TIRUVEDAK	XAM WEST - 625	5234			
		DEPARTMENT OF PHYSICS						
	<b>Course Code:</b>	06CT61	Programme:	B.Sc. Physics	CIA:	Ι		
	Date:	24.01.2023	Part:	III	Semester:	VI		
	Duration:	2 Hours	Academic Year:	2022-23	Max. Marks:	50		
ACTECHTARING SALES	Study Compor	nent:	Core					
	<b>Course Title:</b>	tle: NUCLEAR PHYSICS						

#### **SECTION – A (Remembering)**

Answer	ALL the Ouestions:	$(10 \times 1 = 10)$	Marks)
1	The atomic nucleus was discovered in 1911 by	(	CO1
-	a) Rutherford b) Newton c) Maxwell d) Bohr		001
2	The empirical formula for the nuclear radius (R) is		CO1
-	a) $r_0 A^{2/3}$ b) $r_0 A^{1/3}$ c) $r_0 A^{5/3}$ d) $r_0 A^{9/3}$		001
3	One barn is		CO1
0	a) $10^{-28} \text{ m}^2$ b) $10^{-30} \text{ m}^2$ c) $10^{-24} \text{ m}^2$ d) $10^{-20} \text{ m}^2$		001
4	The range of nuclear force $(\mathbf{R})$ is		CO1
-	a) $1.8 \times 10^{-15}$ m b) $1.5 \times 10^{-15}$ m c) $1.4 \times 10^{-15}$ m d) $1.2 \times 10^{-15}$ m		COI
5	The shell model is able to account for several nuclear phenomena in addition to		CO1
3	a) marie numbers b) packing fraction a) binding energy d) magnetic moment	+	COI
(	a) magic numbers b) packing fraction c) binding energy d) magnetic moment		CO1
0	which chamber has led to the discovery of many elementary particles like position	on, meson,	COI
	etc.?		
	a) Wilson cloud chamber b) Ionisation chamber c) Geiger – Muller counter		
	d) Proportional Counter		
7	The Betatron is a device to accelerate		CO1
	a) protons b) electrons c) neutrons d) mesons		
8	Radioactivity was discovered by		CO2
	a) Henri Becquerel b) Rutherford c) Maxwell d) Bohr		
9	An $\alpha$ – particle is a helium nucleus consisting of two protons and two		CO2
	a) electrons b) protons c) neutrons d) deuteron		
10	The charge carried by each $\alpha$ – particle is		CO2
	a) $3.19 \times 10^{-19}$ C b) $3.19 \times 10^{-11}$ C c) $3.19 \times 10^{-9}$ C d) $3.19 \times 10^{-29}$ C		

## **SECTION – B (Remembering)**

Answer a	any <b>FIVE</b> Questions:	(5 X 2 = 10 Marks)
11	Differentiate between isotopes and isotones.	CO1
12	What is binding energy of a nucleus?	CO1
13	Define packing fraction of a nucleus.	CO1
14	What are the characteristics of nuclear forces?	CO1
15	What is the working principle of an ionization chamber?	CO1
16	Define natural radioactivity.	CO2
17	State Geiger's law.	CO2

## SECTION – C (Understanding)

Answer	any THREE Questions:	(3 X 6= 18 Marks)
18	Explain the Yukawa's Meson theory of nuclear forces.	CO1
19	Explain the liquid drop model of the nucleus with suitable theory.	CO1

20	Alpha particles of energy 5 MeV pass through an ionization chamber at the rate of 10 per	CO1
	second. Assume all the energy is used in producing ion pairs. Calculate the current	
	produced. (35 eV is required for producing an ion pair and $e = 1.6 \times 10^{-19} \text{ C}$ )	
21	Discuss about the determination of the charge of Alpha particles.	CO2
22	Write brief note on Alpha particle spectra.	CO2

## SECTION – D (Applying)

Answer	any ONE Question:	(1X 12= 12 Marks)
23	Explain the construction, theory and limitations of a cyclotron.	CO1
24	List out the various properties of Alpha, Beta and Gamma rays.	CO2

·	VIVEKAN	IANDA COLL	EGE, TIRUVEDAK	XAM WEST - 625	234	
	VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234         DEPARTMENT OF PHYSICS         Course Code:       06EP61       Programme:       B.Sc. Physics       CIA:       I         Date:       25.01.2023       Part:       III       Semester:       VI         Duration:       2 Hours       Academic Year:       2022-23       Max. Marks:       50         Study Component:       Elective       Image: Course Title:       QUANTUM MECHANICS & RELATIVITY       Max. Marks:       50         SECTION - A         Answer ALL the questions::       (10 X 1 = 10 Marks         1. Lenard's Experiment clearly shows that photo particles are					
	Course Code:	06EP61	Programme:	B.Sc. Physics	CIA:	I
	Date:	25.01.2023	Part:	III	Semester:	VI
	Duration:	2 Hours	Academic Year:	2022-23	Max. Marks:	50
	Study Compo	nent:	Elective			
	<b>Course Title:</b>	QUANTUM 1	MECHANICS & RI	ELATIVITY		
5	:	1				
			SECTION – A			
Answer	ALL the question	S:	nhata nantialas ana		(10 X 1 = 10 Mark)	S \1
a)Ele	ctrons	b) neutrons	c) Protons	d) none of t	hese	/1
		-,	-,			
2. The $e$	energy of a photon i	s directly related	l to	1	CO	)1
a) fr	equency	b) intensity	c) wave numb	d) time peri	od	
3. Critic	cal frequency is one	whic	h no photoelectrons ar	e emitted.	CO	)1
a) ab	ove	b) below	c) at	d) all the ab	oove	
1 Ear	n alastron the mini		dad to accord from a	nontioulon motol curfe		
4. For a of th	e metal.	mum energy nee	ded to escape from a	particular metal surfa	CO	- D1
a) w	ork function b) ior	nization energy	c) quantum energy	d) potential energy	1	-
5. Wave	e number of a partic $-12$	the is given by $k$	=	d) 4-/ )	CO	)1
a) 2	<i>117</i> <b>K</b>	0)2n <b>x</b>	C) <b>K</b> 7 2h	u) 4117 r		
6. Unit	for wave number is				CO	)1
a) ra	adian / sec	b) radian / me	tre c) radians	d) metre		
7 The	velocity and hence t	he energy of the	emitted photoelectror	e is independent of t	he of light <b>CO</b>	11
and	depends only on th	e frequency of the	incident light and th	is is independent of the metal	l.	'1
a) ii	ntensity	b) wavelengt	h c) wave num	ber d) None of t	these	
8. The d	e-Broglie waveleng	th of a particle c	of mass 'm' and veloci	ty 'v' is given by	CO	)2
a) λ=	$=\frac{\pi}{3mv}$	b) $\lambda = \frac{\pi}{\sqrt{3}mv}$	c) $\lambda = \frac{n}{mv}$	d) $\lambda = \frac{4\pi}{mv}$		
9. Heise	nberg Uncertainty p	principle is given	by		CO	)2
a) ∆ 10 Davi	$\Delta x \Delta p = h/2\pi$	b) $\Delta x \Delta p = h/4$	$\pi$ c) $\Delta x \Delta p \ge h/4$	$4\pi$ d) $\Delta x \Delta p \ge h$	$n/2\pi$	12
a) T	The value of Planck'	's constant	b) The wav	e nature of electrons	CO	
c) T	he nuclear size		d) Ratio of	<i>e</i> value		
			SECTION – B	m		
Answer	any FIVE Question	ons:			(5 X 2 = 10 Marks)	)
11. Def	ine photoelectric ef	fect.			CO	1
12. Def	ine threshold freque	ency.			CO	1
13. Stat	e quantum theory.	f a metal			CO	1 1
14. Del 15. Wh	at are photoelectric	cells?			CO	1
16. Defi	ne group velocity.				CO	2
17. State	e Heisenberg's unce	rtainty principle			CO	2

#### **SECTION - C**

#### **Answer any THREE Questions:**

- 18. Calculate the work function of Sodium in electron-volts, given that the threshold wavelength is  $6000 \times 10^{-10}$ m, and h = 6.625 x  $10^{-34}$ Js **CO1 CO1**
- 19. State the laws of photoelectric emission.
- 20. Derive Einstein's photoelectric equation.
- 21. Derive the expression for Broglie wavelength.
- 22. Show that the Broglie wavelength associated with an electron of energy V eV is approximately **CO2**  $(1.22 / \sqrt{V})$  nm.

#### **SECTION – D**

Answer any ONE Question:	(1X 12= 12 Marks)
23. Illustrate Lenard's method to determine e/m for photoelectrons.	CO1
24. Describe Davisson and Germar experiment for study of electron diffraction	CO2

#### &&&&&&&

#### (3 X 6= 18 Marks)

**CO1** 

**CO2** 

		DEPART	MENT OF PHYS	ICS		
	Course Code:	06SB61	Programme:	B.Sc. Physics	CIA:	I
	Date:	18.01.2023	Part:	IV	Semester:	V
	Duration:	1 Hour	Academic Yea	<b>r:</b> 2022-23	Max. Marks:	25
AND HEART HEAD	Study Compo	nent:	Skill Based			
	<b>Course Title:</b>	NANO TECH	INOLOGY			_
			SECTION – A			
Answer A	LL the Questions:				(5 X 1 = 5 Marl	ks)
1 V	Vho first defined the	term nanotechno	ology?		СО	1
a	)Eric Drexler b) Rich	nard raphem c	) Norio Taniguchi	d) Heinrich Rohrer		
<b>2</b> T	The energy separation	between valenc	e band and conduct	ion band is called	СО	1
a	)Energy gap b) Band	l gap c) Fermi	level d) both a and	b		
<b>3</b> T	The thermal conductiv	vity of nanomate	erial is times	s greater than metal.	СО	1
a	)10 b) 100	c) 50	d) 6	0		
<b>4</b> T	The organic nanomate	erial fullerene is	a class of allotropes	of	CO	1
• - a	) rapheme b) carbo	n c) lithium d)	argon			-
5 5	FM stands for	ii e) iitiiidiii u)	urgon		CO	1
<b>2</b> 0	Scanning Electrode	Microscope b)	Canning Electrical	Microscope	00	•
a	Scanning Electron N	Aicroscope d)	Scanning Encourtear I	Microscope		
C	)Seaming Election 1	meroscope u).	SECTION – B	wheroscope		
Answer a	ny <b>TWO</b> Questions:		SECTION - D		(2 X 2 – 4 Marl	ze)
6 V	What is Nanotechnold	ary?				1
0 v 7 v	What is Nanotechnold	ngy:			C0	1
у у 9 г	Vilat IS Ivanoniaterial	:			C0	1
o L	Write down the abusi	c.			C0	J 1
9 V	vrite down the physic		SECTION C	material.	CO	1
<b>A</b> maximum as	ny ONE Question		SECTION – C			(~~)
Answer a		4 4	. • •		$(\mathbf{I} \mathbf{X} 0 = 0 \mathbf{M} \mathbf{a} \mathbf{f})$	(S) 1
10 (	five a brief account of	on the types of ha	anomaterials.	1 1	00	1
II L	list out of some appli	cations of nanor	naterials to biology	and medicine.	CO	5
			SECTION – D		<i></i>	
Answer a	ny <b>ONE</b> Question:				(1 X 10= 10 Marl	KS)
12 E	Explain about the s	surface, electric	al, optical, therma	ll and mechanical p	properties of CO	1
11	unonnatoriano.					

**13** Discuss briefly about the applications of nanomaterials.

#### **VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234 DEPARTMENT OF PHYSICS** 06SB62 Ι **Course Code: Programme: B.Sc.** Physics CIA: Date: 19.01.2023 Part: IV Semester: VI Academic Year: 2022-23 Max. Marks: **Duration:** 1 Hour 50 **Study Component:** Skill Based **Course Title:** PHYSICS FOR COMPETITIVE EXAMINATIONS

Answer **ALL** the Questions:

- 1.  $M^{1}L^{1}T^{-1}$  is the dimension of
  - A. power B. momentum C. force D. couple
- 2. The unit of power is
  - A. kilowatt B. kilowatt-hour C. dyne D. Joule
- 3. The unit of G in SI system is A. Nm⁻²kg⁻² B. Nm⁻²s⁻² C. Nms⁻² D. Nm²kg⁻²
- 4. The SI unit of universal gas constant (R) is A. JK⁻¹mol⁻¹ B. NK⁻¹mol⁻¹ C. WattK⁻¹mol⁻¹ D. ergK⁻¹mol⁻¹
- 5. The dimensional formula for Planck's constant (h) is A.  $[ML^2T^{-3}]$  B.  $[ML^2T^{-2}]$  C.  $[ML^2T^{-1}]$  D.  $[ML^{-2}T^{-2}]$
- 6. If L and R denote inductance and resistance respectively, then the dimension of L/R is A.  $M^0 L^0 T^0 B$ .  $M^0 L^0 T^1 C$ .  $M^2 L^0 T^2 D$ .  $MLT^2$
- 7. Electron volt (eV) is the unit of
- A. potential difference B. charge C. Current D. Energy
- 8. Newton's first law of motion gives the concept of
- A. energy B. work C. inertia D. Momentum
- 9. Conservation of linear momentum is equivalent to A. Newton's second law of motion B. Newton's first law of motion C. Newton's third law of motion D. Conservation of angular momentum
- 10. A projectile is fired at an angle  $\theta$  to the vertical with a small velocity. The path described is A. circle B. parabola C. ellipse D. hyperbola
- A canon after firing recoils due to

   A. conservation of energy B. backward thrust of gases produced C. Newton's third law of motion D. Newton's first law of motion
- 12. In planetary motionA. the angular speed remains constant B. the angular momentum remains constant C. the linear speed remains constantD. the linear momentum remains constant
- A rocket or jet engine works on the principle of A. conservation of linear momentum B. conservation of angular momentum C. conservation of energy D. conservation of mass
- 14. Two bodies of mass 1 kg and 4 kg are moving with equal kinetic energies. The ratio of their linear momentum is
- A. 1:2 B. 2:1 C. 4:1 D. 1:4
  15. An inertial frame is one in which
  A. Newton's 1st law of motion is valid B. Newton's 2nd law of motion is valid C. Newton's 3rd law is valid D. Newton's 1st law of motion is invalid
- 16. In the absence of external force the velocity of center of massA. is zero B. is constant C. increases D. Decreases
- 17. If a gymnast, sitting on a rotating stool with his arms outstretched suddenly lowers his arms A. the angular velocity decreases B. his M.I. decreases C. the angular velocity remains constant D. the angular momentum increases

(50 X 1 = 50 Marks) CO1

- 18. The necessary and sufficient condition for S.H.M. isA. constant period B. constant acceleration C. proportionality between restoring force and displacement D. none of the above is correct
- 19. When the amplitude of a particle executing S.H.M. increases, its time period
- A. decreases B. remains unchanged C. increases D. may increase or decrease depending upon phase 20. The period of the pendulum is doubled when
- A. its length is doubled B. the mass of the bob is doubled C. its length is made 4 times D. the mass of bob and the length of the pendulum are doubled
- 21. A loaded spring vibrates with a period T. The spring is now divided into nine equal parts and the same load is suspended from one of these parts. The new period is
  A. T/3 B. T/9 C. 3T D. T
- 22. The differential equation representing the free vibrations of a body is  $\frac{d^2 y}{dt^2} + \omega^2 y = 0$ . The

natural frequency of the body is

A.  $\omega/2\pi$  B.  $2\pi/\omega$  C.  $\omega$  D.  $\omega^2$ 

23. If the distance between the earth and moon were doubled, the gravitational attraction between them would be

A. one-half of the original value B. one-fourth of the original value C. doubled. D. four times the original value

24. The period of a satellite in a circular orbit of radius R is T. The period of another satellite in a circular orbit of radius 4R is

A. 4T B. T/4 C. 8T D. T/8

25. A given mass of a metal is moulded into solids of different shapes. Its surface area is the least when it is

A. a right circular cylinder B. a paraboloid of revolution C. a right circular cone D. a sphere 26. A liquid drop tends to assume a spherical shape because of

A. the surface tension force B. the viscous force C. the gravitational force D. the elastic force 27. A spring is made of steel and not of copper because

A. elasticity of steel is greater than that of copper B. elasticity of steel is less than that of copper C. plasticity of copper is greater than that of steel D. plasticity of steel is greater than that of copper

- 28. In kinetic theory of gases, one assumes that the collisions between the molecules are A. perfectly inelastic B. perfectly elastic C. partially inelastic D. partially elastic
- 29. Internal energy of a gram molecule of an ideal gas depends onA. pressure only B. volume alone C. temperature alone D. both on pressure as well as temperature
- 30. Which of the following gases possesses maximum root mean square velocity?A. Hydrogen B. Carbon dioxide C. Nitrogen D. Oxygen
- 31. The temperature at which the velocity of oxygen will become half of hydrogen at N.T.P is
  A. 1092 °K B. 273 °K C. -273 °K D. 1492 °K
- 32. A nuclear fusion reaction will occur in a gas of deuterium nuclei when the nuclei have an average kinetic energy of at least 0.72 MeV. If  $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$ , the temperature required for nuclear fusion to occur with deuterium is about

A.  $5 \times 10^{11}$  K B.  $5 \times 10^{10}$  K C.  $5 \times 10^{9}$  K D.  $5 \times 10^{8}$  K

33. If masses of all molecules of a gas are halved and their speeds doubled, then the ratio of initial and final pressures will be

A. 2:1 B. 1:2 C. 4:1 D. 1:4

- 34. The equivalence of two systems in thermal equilibrium is represented by the property A. temperature B. heat C. specific heat D. energy
- 35. Thermodynamics mostly deals with

A. change of state<br/>quantity of heatB. conversion of heat into other forms of energy<br/>D. transfer of heatC. measurement of<br/>C. measurement of

- 36. An ideal gas heat engine operates in a Carnot cycle between 227 ° C and 127 ° C. It absorbs 6 X 10⁴ cals at the higher temperature. The amount of heat converted into work is equal to A. 4.8 X 10⁴ cals B. 3.5 X 10⁴ cals C. 1.6 X 10⁴ cals D. 1.2 X 10⁴ cals
- 37. The thermodynamic process, in which temperature of the system remains constant, is called A. isothermal B. adiabatic C. isomeric D. isobaric
- 38. The area under the curve on P-V diagram representsA. work done on or by the system B. work done in a cyclic process C. the thermodynamic processD. the condition of the system
- 39. The triple point of a substance is the temperature at whichA. the liquid and the gas phases are in equilibrium B. the solid and the gas phases are in equilibrium C. the solid and the liquid phases are in equilibrium D. all the three phases, i.e., solid, liquid and gas are in equilibrium
- 40. A perfect gas is compressed to ¹/₄ th of its original volume. The initial pressure of the gas is 1 atm. If the compression is isothermal, the final pressure will be A. 4 atm B. ¹/₄ atm C. 16 atm D. 1/16 atm

A. 4 atm B.  $\frac{1}{4}$  atm C. 16 atm D.  $\frac{1}{16}$  atm

- 41. 1 kg of ice at 0°C is melted and converted to water at 0°C. The change of entropy is
  A. 29.3 cal/°K B. 293 cal/°K C. 2.93 cal/°K D. 2930 cal/°K
- 42. The freezer in a refrigerator is located in the top section so that A. the entire chamber of the refrigerator is cooled quickly B. motor is not heated C. heat gained from environment is less D. heat gained from environment is more
- 43. A body which absorbs all the radiations incident over it is called asA. good absorber B. good emitter C. good transmitter D. perfectly black body
- 44. We receive heat energy from the Sun by A. radiation B. conduction C. convection D. diffraction
- 45. The radiation emitted by a perfectly black body is proportional toA. temperature on the ideal gas scale B. fourth root of temperature on ideal gas scaleC. fourth power of temperature on ideal gas scale D. source of temperature on ideal gas scale
- 46. According to Newton's law of cooling, the rate of cooling isA. proportional to the square of the excess temperature B. proportional to the excess of temperature C. equal to the excess of temperature D. inversely proportional to the square of the excess temperature
- 47. Prof. S. N. Bose's contribution was to give
  A. A derivation of Kirchhoff's law B. A suggestion that bodies emit and absorb radiations at all temperatures
  C. A definition of black body
  D. A rigorous derivation of Planck law
- 48. Light waves are A. transverse B. longitudinal C. neither longitudinal nor transverse D. shear waves
- 49. In the propagation of electromagnetic waves the angle between the direction of propagation and plane of polarization is

A. 0° B. 45° C. 90° D. 180°

- 50. Quantum nature of light is not supported by the phenomenon of
  - A. Compton effect B. photoelectric effect C. emission or absorption spectrum

D. interference of light waves

	VIVEKANA	NDA COLLEC	E, TIRUVEDAKA	M WEST - 625	234			
		DEPARTMENT OF PHYSICS						
	Course Code:	06SB63	Programme:	B.Sc. Physics	CIA:	Ι		
	Date:	27.01.2023	Part:	IV	Semester:	VI		
	Duration:	1 Hour	Academic Year:	2022-23	Max. Marks:	25		
	Study Compo	nent:	Skill Based					
	<b>Course Title:</b>	MEDICAL II	NSTRUMENTATIO	DN	•	4		

1 X 6 = 6 Marks

#### **SECTION-A**

Aı	nswer All the questions:	5 X 1 = 5 Marks
1.	Physiological parameter(s) of our biological system is/are	CO1
	a) velocity of blood flow b) temperature c) blood pressure d) all the above	ve
2.	is the measure of the reproducibility of the measurements	<b>CO1</b>
	a) Precision b) Simplicity c) Stability d) Hysteresis	
3.	The ability of an instrument to detect even a very small change in the input is called	<b>CO1</b>
	a) sensitivity b) accuracy c) linearity d) frequency	
4.	is called cardiac pacemaker.	CO2
	a) Sino Atrial node b) Atrio-Ventricular node c) The bundle of HIS d) Purkin	nje fibres
5.	Universally adopted ECG lead colour for Right leg is	CO2
	a) Red b) Blue c) Green d) Black	

#### **SECTION-B**

Answer any TWO questions:	2 X 2 = 4 Marks
6. Define linearity.	C01
7. What is called Signal-to-Noise ratio?	CO1
8. What is the amplitude of QRS complex in ECG wave?	CO2
9. Draw Einthoven triangle.	CO2
SECTION-C	

#### SECTION-C

# Answer any ONE questions:

#### 10. With the help of a block diagram, write about components of Bio-medical instrument system. CO1 11. With a neat diagram describe Augmented Unipolar Limb Leads. **CO2**

#### **SECTION-D**

Ans	swer any ONE questions:	1 X 10 = 10 Marks
12.	Explain Bipolar Limb Leads with neat diagrams.	C01
13.	With diagram explain ECG Recording setup.	CO2

		DEPART	MENT OF PHYS	ICS	<b>4</b> VT	
	Course Code:	06SE41	Programme:	B.Sc. Physics	CIA:	Ι
	Date:	19.01.2023	Part:	IV	Semester:	IV
	Duration:	1 Hour	Academic Yea	<b>r:</b> 2022-23	Max. Marks:	25
AND HEART HEA	Study Component	nent:	Skill Enhancen	nent Course		
	<b>Course Title:</b>	ASTROPHY	SICS			
			SECTION – A			
Answer	ALL the Questions:				(5 X 1 = 5 Mark	(s)
1	The core of the lunar	interior has a rac	lius of about		СО	1
	a)600 km b)700 km	c)6000 km c	1)7000 km			
2	Regolith means				CO	1
	a)earth soil b)lunar so	il c)mars soil d	)bible			
3	Anyone with a compa	ss knows, the ea	rth has a		CO	1
	a)earth field b)electr	omagnetic field	c)magnetic field	d)none		
4	As the air near the gro	ound is heated, i	t	, ,	СО	1
	a)contracts b)expan	nds c)goes d	own d)goes up			
5	Most familiar and cha	racteristic featur	res on the moon are	its	СО	1
	a)mountains b)maria	a c)craters d)v	volcanoes			
	, , ,	, ,	SECTION – B			
Answer	r any <b>TWO</b> Questions:				(2 X 2 = 4 Mark	(s)
6	Define Magnetospher	e.			СО	1
7	Define Lunar eclipse.				CO	1
8	Define Solar eclipse.				CO	1
9	What is Maria?				CO	1
			SECTION – C			
Answer	r any <b>ONE</b> Question:				(1 X 6= 6 Mark	(s)
10	Sketch the layers in th	e atmosphere.			СО	1
11	Write a short note on	Moon.			CO	1
			SECTION – D			
Answer	r any <b>ONE</b> Question:				(1 X 10= 10 Mark	(s)
12	Explain the history of	the earth with d	iagram.		СО	1
			4 1'		CO	1

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234						
		DEP	ARTMENT OF PH	IYSICS		
	Course Code:	06AE02	Programme:	B.Sc. Maths / Chemistry	CIA:	II
	Date:	10.03.2023	Part:	III	Semester:	II
	Duration:	2 Hours	Academic Year:	2022-23	Max. Marks:	50
	Study Component:         Ability Enhancement Course					
	<b>Course Title:</b>	ALLIED PHY	D PHYSICS - II			

----

## **SECTION – A (Remembering)**

	SECTION – A (Remembering)		
Answer 1	ALL the Questions: (10 X Direct evidence for the existence of magnetic moments of atoms and their space quantized	$\mathbf{I} = 10$	Marks) CO2
	is provided by the experiment.		
	a) Jaegars method b) Michelson c) Stern-Geralch d) Laurent's polarimeter		
2	The magnetic moment due to electron spin is equal toBohr magnetron		C <b>O2</b>
	a) One b) two c) three d) four		
3	Which of the following are called noble gases?		C <b>O2</b>
	a) Chromium b) cadmium c) zinc d) krypton		
4	Which of the following are not noble gases?		C <b>O2</b>
	a) Argon b) xenon c) zinc d) krypton		
5	The precise nature of the forces acting in the is unknown		C <b>O</b> 3
	a) nucleus b) atom c) proton d) electron		
6	The theory of general relativity was developed by		C <b>O</b> 4
	a) Michael faraday b) Albert Einstein c) Newton d) George Boole		
7	According to the theory of relativity, which of the following always remains constant?		CO 4
	a)Length of an object b) time c) space d) velocity of light		
8	In the equation $E = mc^2$ , what does 'm' stand for?		CO 4
	a)Mass b) distance c) velocity d) time		
9	The shortening or contraction in the length of an object along its direction of motion is		CO 4
	a)Lorentz force contraction b) Lorentz – Galilean contraction		
	c) Lorentz - Fitzgerald contraction d) Lorentz - Einstein contraction		
10	If 4kg of a substance is fully converted into energy, how much energy is produced?		CO 4
	a) $3.6 \ge 10^{17}$ J b) $2.6 \ge 10^{17}$ J c) $3.6 \ge 10^{10}$ J d) $3.6 \ge 10^{-17}$ J		
	SECTION – B (Remembering)		
Answer	any FIVE Questions: (5 X	2 = 10	Marks)
11	Write a short note on magnetic dipole moment due to spin	(	CO 2
12	Define Bohr electron magneton	(	CO 2

 $13 \quad \mbox{Give the principle of Stern and Gerlach experiment}$ **CO 2** CO 3 14 Define the term unified mass unit

15	State the postulates of the theory of relativity.	<b>CO 4</b>
16	What is inertial frame?	<b>CO 4</b>
17	Write down about twin paradox.	<b>CO 4</b>
Answer	SECTION – C (Understanding) (3 X 6= 18	8 Marks)
18	Describe the theory and experimental arrangement of stern and gerlach experiment	CO 2
19	Derive Einstein mass energy relation.	<b>CO 4</b>
20	Using Lorentz transformation equation, explain Length Contraction in detail.	<b>CO 4</b>
21	Calculate the rest energy of an electron in joules and in electron volts.	<b>CO 4</b>
22	How fast rockets have to go relative to an observer for its length to be contracted to 99% of	<b>CO 4</b>
	its length at rest?	
Answei	SECTION – D (Applying) (1X 12= 12)	2 Marks)
23	What do you understand by Nuclear fission? Explain the release of energy during nuclear	CO 3
	fission	
24	Derive Lorentz transformation equation.	CO 4

VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234								
	DEPARTMENT OF PHYSICS							
	Course Code:	06CT21	Programme:	B.Sc. Physics	CIA:	II		
	Date:	06.03.2023	Part:	III	Semester:	II		
	Duration:	2 Hours	Academic Year:	2022-23	Max. Marks:	50		
MANDHEARTHEAD	Study Compor	ient:	Core Course					
	<b>Course Title:</b>	THERMODY	HERMODYNAMICS AND STATISTICAL MECHANICS					

## **SECTION – A (Remembering)**

Answer	ALL the Questions:  (10 X 1 = 10 M)	(arks)
1	In which condition can real gas obey closely the ideal gas equation?	CO2
	a) pressure is very small and temperature is very high b) pressure is very high and	
	temperature is very low c) both pressure and temperature are very high	
	d) both pressure and temperature are very low	
2	At the maximum inversion temperature in the graph of isenthalpic or Joule-Kelvin	CO2
	expansion of a gas, the value of Joule-Kelvin coefficient is	
	a) negative b) positive c) zero d) positive, negative or zero depends upon initial	
	temperature	
3	Compressed air in Linde's method is cooled by	CO2
	a) vacuum pump b) cool air c) ice d) water	
4	In superconductivity, the electrical resistance of material becomes	CO2
	a) Zero b) Infinite c) Finite d) All of the above	
5	An isochoric process occurs at constant	CO3
	a) volume b) pressure c) heat d) temperature	
6	According to Kelvin-Planck statement, it is for a heat engine to produce net work in a	CO3
	complete cycle if it exchanges heat only with bodies at	
	a) impossible, single fixed temperature b) possible, changing temperature	
_	c) impossible, changing temperature d) possible, single fixed temperature	~~
7	The physics of underlying the working of a refrigerator closely resembles the physics	CO3
	underlying	
	a) ice formation b) heat engine c) vapour compression machine	
0	d) vaporization of water	001
8	The door of running refrigerator inside a room is left open. Mark the correct statement	003
	a) the room will be cooled signify b) the room will be warmed up gradually c) the room will be cooled to the temperature inside refrigerator. d) the temperature of the room will	
	remain unoffected	
0	At constant temperature (II being the internal energy)	CO3
,	a) U change when V or P changes (b) U does not change when V or P changes	COS
	c) If does not change when T changes d) If is not a function of temperature	
10	The value of probability of an event cannot be	CO4
10	a) zero b) 1 c) $\frac{1}{2}$ d) negative	0.04

## **SECTION – B (Remembering)**

Answer any <b>FIVE</b> Questions:	(5 X 2 = 10 Marks)
<b>11</b> What is critical coefficient?	CO2
<b>12</b> What is Joule-Thomson effect?	CO2
13 What is a superconductor?	CO2

Differentiate between open and closed system.	CO3
State the zeroth law of thermodynamics.	CO3
What is a reversible process?	CO3
Define probability of an event.	CO4
	Differentiate between open and closed system. State the zeroth law of thermodynamics. What is a reversible process? Define probability of an event.

## SECTION - C (Understanding)

Answei	any <b>THREE</b> Questions:	(3 X 6 = 18 M)	larks)
18	Describe Linde's process for liquefaction of air.		<b>CO2</b>
19	Show that for an adiabatic change in a perfect gas $PV^{\gamma} = constant$ .		<b>CO3</b>
20	Calculate the work done during an isothermal process.		CO3
21	A motor car tyre has a pressure of 2 atmospheres at the room temperature of 27	°C. If the	<b>CO3</b>
	tyre suddenly bursts, find the resulting temperature.		
22	Find the efficiency of a Carnot's engine working between 127 °C and 27 °C. It	absorbs 80	CO3
	cals of heat. How much heat is rejected?		

## SECTION – D (Applying)

Answer		(arks)
23	Calculate the work done in a Carnot's cycle of operations. Deduce the efficiency of a	<b>CO3</b>
	Carnot's engine in terms of the temperatures between which it works.	
24	Obtain the general form of Maxwell – Boltzmann energy distribution law.	<b>CO4</b>

	DEP	ARTMENT OF PH	YSICS		
<b>Course Code:</b>	06CT22	Programme:	B.Sc. Physics	CIA:	II
Date:	09.03.2023	Part:	III	Semester:	II
Duration:	2 Hours	Academic Year:	2022-23	Max. Marks:	50
Study Compo	nent:	Core Course			
<b>Course Title:</b>	<b>OPTICS AN</b>	D SOUND			
<ul> <li>2 The separation between a) Very small b) verther as a very small b) very small b) very and a very small b) N and a very sm</li></ul>	een screen and a ry large c) into R of the grating n c) Fm	perture in Fraunhofer ermediate d) zero g is d) Cm	diffraction is	CO CO	2 2
The Bragg's law relation $a$ $m\lambda$ $b$ $\alpha\lambda$	tion 2d sin $\theta =$ c) $\omega^2 \lambda$	d) zero		CO	2
For proper communic	ation, the transm	itting antenna, receivin	g antenna and E of th	e CO	3
electromagnetic wave	should be	to each other			
a) parallel b) perp	endicular c) b	oth a and b d) neith	er a nor b		
Transverse nature of	ight is best show	n by		CO	3
a) interference b) dif	fraction c) polariz	zation d) refraction			

7 On an ideal polarizing sheet, the intensity of the polarized light transmitted through the sheet is CO 3
 _____ of the incident intensity

a) 25% b) 50% c) 40% d) 100%

8 Intensity of the transmitted light beam from the polarizer is calculated by CO 3 a)I = Im  $\cos^2\Theta$  b) I = Im  $\sin^2\Theta$  c) I = Im  $\sin^2\omega$  d) I = Im  $\sin\omega$ 

9 The phenomenon by which the incident light falling on a surface is sent back into the same CO 3 medium is known as

**CO**4

- a) Polarization b) reflection c) refraction d) absorption
- 10 A particle moves in a circular path, with a uniform speed. Its motion isa) periodic b) simple harmonic c) oscillatory d) angular simple harmonic

#### **SECTION – B (Remembering)**

r any <b>FIVE</b> Questions:	(5 X 2 = 10 Marks)
What is grating?	CO 2
What is X-ray?	CO 2
What is holography?	CO 2
1	r any <b>FIVE</b> Questions: What is grating? What is X-ray? What is holography?

14	Define polarization	CO 3
15	What is Polaroid?	CO 3
16	What do you meant by optical activity?	CO 3
17	Write down the some applications of simple harmonic motion.	<b>CO 4</b>

## SECTION – C (Understanding)

Answer any <b>THREE</b> Questions: (3 X G				
18	Derive the formula for the minima in the single slit diffraction.		CO 2	
19	Explain the phenomenon of polarization of electromagnetic waves		CO 3	
20	Give a brief not on polarizing sheets		CO 3	
21	We wish to use a plate of glass (n=1.50) in air as a polarizer. Find the polarizing angle and the	ne angle	CO 3	
	of refraction			
22	Explain in detail about the double refraction		CO 3	

## SECTION – D (Applying)

Answer	any <b>ONE</b> Question:	(1X 12= 12 Marks)
23	Describe the polarization by reflection with a neat diagram	CO 3
24	Solve the equation of motion of simple harmonic oscillator.	<b>CO 4</b>

#### VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234

	DEPARTMENT OF PHYSICS						
	Course Code:	06CT41	Programme:	B.Sc. Physics	CIA:	II	
	Date:	06.03.2023	Part:	III	Semester:	IV	
	Duration:	2 Hours	Academic Year:	2022-23	Max. Marks:	50	
HANDHEARTHEAD	Study Compor	nent:	Core Course				
	<b>Course Title:</b>	ANALOG EL	ECTRONICS				

## **SECTION – A (Remembering)**

Answ	er ALL the Questions	:			(10 X 1 = 10)	Marks)
1	In a transistor,	••				CO2
2	a) $I_C = I_E + I_B$ The value of $\beta$ for a t	b) $I_B = I_C + I_E$ transistor is gener	c) ally	$I_{\rm E} = I_{\rm C} - I_{\rm B}$	d) $I_E = I_C + I_B$	CO2
3	a) 1 A JEFT is similar in	b) less than 1 operation	c) valve.	Between 20 and 50	00 d) above 500	CO2
4	a) diode Which of the followi	b) pentode ng device has low	c) vest noise	triode -level	d) tetrode	CO2
5	a) triode The operating point i	b) bipolar Trans s also called the	sistor c)	tetrode	d) JEFT	CO3
6	a) cut off point The base resistor me	b) quiescent poi thod is generally	int c) used in	saturation point	d) active point	CO3
7	a) amplifier circuits Transistor biasing is	b) switching cir done to keep	cuits o	c) rectifier circuits in the circuit .	d) regulator circuits	CO3
	a) proper direct curre	nt t	o) proper a	alternating current		
8	c) the base current is The disadvantages of	small c the voltage divic	1) collecto ler bias is	or current small that it has		CO3
	a) high stability facto	or t	b) low bas	se current		
9	c) many resistors RC coupling is used	for	l) high int	put impedance		CO3
	a) voltage amplificat	tion t	o) current	amplification		
	c) power amplificati	on c	d) voltage	stabilization		
10	An oscillator convert	S				CO4
	a) a.c. power into a	l.c. power		b) d.c. power	into a.c. power	
	c) mechanical pow	er into a.c. power	ſ	d) d.c. to oscil	lation	

#### **SECTION – B (Remembering)**

<b>CO2</b>
~ ~ •
CO2
<b>CO2</b>
CO3
<b>CO3</b>
CO3
CO4

## **SECTION – C (Understanding)**

Answ	er any <b>Tl</b>	HREE Qu	estions:	( <b>3</b> X 6= 18 I	Marks)
18	A JFET	has a drai	n current	of 5mA. If $I_{DSS} = 10$ mA and $V_{GS(off)} = -6V$ , Find the value of	CO2
	(i)	V _{GS}	and	(ii) V _P	
19	Differer	ntiate betw	een JFE7	f and bipolar transistor.	CO3

20	Explain the base resistor method of transistor biasing.	CO3
21	Explain the biasing with collector feedback resistor method.	CO3
22	Draw the circuit of a practical single stage transistor amplifier . Explain the function of	CO3
	each component.	

## **SECTION – D (Applying)**

Answ	er any <b>ONE</b> Question:	(1X 12= 12 Marks)
23	Describe the working of voltage divider bias method of Transistor biasing.	CO3
24	Explain the working of Hartley oscillator.	CO4

#### VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234 DEPARTMENT OF PHYSICS

	Course Code:	06CT42	Programme:	B.Sc. Physics	CIA:	II
	Date:	09.03.2023	Part:	III	Semester:	IV
	Duration:	2 Hours	Academic Year:	2022-23	Max. Marks:	50
	Study Compor	nent:	Core Course			
	<b>Course Title:</b>	NUMERICAL	L METHODS			

#### **SECTION – A**

#### Answer All the questions:

1. Which of the following statement is wrong?

- a) If two linear systems have the same solution set, then they are equivalent.
- b) The augmented matrix and the coefficient matrix of a linear system have the same number of rows
- c) For a linear system, the number of columns of augmented matrix is larger than the number of columns of coefficient matrix by 1
- d) The augmented matrix and coefficient matrix have the same number of columns
- 2. Which of the following statement is true?
  - a) Each elementary row operation on an augmented matrix never change the solution set of the associated linear system b) Two matrices are equivalent if they have the same number of rows a) If two linear systems have the same aslation set then they have the same superior set they have the same set they have the same superior set they have the same superior set they have the same superior set they have the same set the same set they have the same set they have the same set the same
  - c) If two linear systems have the same solution set, then they have the same augmented matrix d) It two linear systems have the same coefficient matrix, then they have the same solution set
- 3. Which of the following row operations on a matrix may not be an elementary operation? **CO2** a) replace one row by the sum of itself and other two rows b) multiply all entries of a row by a number c) interchange the first row and the last row d) replace one row by the difference of itself and another row
- 4. To ensure that the following system of equations,

$$2x_{1} + 7x_{2} - 11x_{3} = 6$$
  

$$x_{1} + 2x_{2} + x_{3} = -5$$
  

$$7x_{1} + 5x_{2} + 2x_{3} = 17$$

converges using Gauss-Seidel Method, one can rewrite the above equations as follows:

	2	7	-11]	$\begin{bmatrix} x_1 \end{bmatrix}$		6		7	5	2 ]	$\begin{bmatrix} x_1 \end{bmatrix}$		[17]		7	5	2 ]	$\begin{bmatrix} x_1 \end{bmatrix}$		6
a)	1	2	1	<i>x</i> ₂	=	-5	b)	1	2	1	<i>x</i> ₂	=	-5	c)	1	2	1	<i>x</i> ₂	=	-5
	7	5	2	$x_3$		_17		2	7	-11	<i>x</i> ₃		6		2	7	-11	<i>x</i> ₃		_17 _

d) The equations cannot be rewritten in a form to ensure convergence

- **CO3** 5. Polynomial Interpolation is used to compute a) values of argument b) integration c) differentiation d) all the above 6. Which among the following is correct? **CO3** a)  $E = 1 + \Delta$ b)  $E = 1 - \Delta$ c)  $E = \Delta$ d)  $E = \Delta - 1$ 7. Gauss forward interpolation formula is applicable if u is _____ **CO3** b) one c) between 0 and 1 d) greater than 1 a) zero 8. If interpolation is required near the end of the tabular values we use **CO3** a) Newton-Gregory's forward interpolation formula b) Newton-Gregory's backward interpolation
- formula c) Stirling formula d) Bessel formula
  9. ______ is the process of finding the most appropriate estimate for missing data.
  a) finite difference b) iteration c) interpolation d) root finding
  10. In Interpolation techniques the value of u is given by

10. In Interpolation techniques the value of u is given by a)  $u = (x - x_0) / h$  b)  $u = (x_0 - h) / x$  c)  $u = h x / x_0$  d)  $u = x x_0 / h$ 

10 X 1 = 10 Marks CO2

**CO2** 

CO2

#### **SECTION – B**

Answer any FIVE Questions: 11. When does the Iterative method 12. Write down the advantage of Itera 13. Which method, Gauss-Jacobi system of algebraic equations <b>Ax</b> = 14. Why do we prefer polynomial ± 15. Give the main features of Greg 16. For performing interpolation of difference formulas? 17. Write down the Newton-Cote's	d succeed in so tion method ov method or Ga b? interpolation? ory-Newton's of a given dat	olving all sy er direct met auss-Seidel forward int ta, when do ormula.	extems of equation hod in solving syst method converge erpolation formut we use the New	5 X 2 = 10 Marks as? CO2 ems of equations. CO2 es faster, for the solution of a CO2 CO3 la. CO3 vton's forward and backward CO3 CO4
	1	SECTION	C	
Answer any THREE Questions: 18. Solve the system of equations x + y + 54z = 27x + 6y - z =	by Gauss-Seid 110 85	del method	- C	3 X 6 = 18 Marks CO2
6x + 15y + 2z = 19. From the following table of h	= 72 alf-yearly pre	emium for p	olicies maturing	at different ages, estimate the
premium	and (2			CO2
$\mathbf{Age}  \mathbf{x} \cdot \mathbf{A5}$	and 63	55	60	65
<b>Premium v :</b> 114.84	96.16	83.32	74.48	68.48
20. Find a polynomial of degree ty	vo which take	s the values		
$\mathbf{x}: 0  1  2$	3 4	5	6 7	
<b>y</b> : 1 2 4	7 11	16	22 29	
21. The following data are taken f	rom steam tab	le		CO3
<b>Temp ⁰C:</b> 140	150	160	170	180
<b>Pressure kgf/cm²: 3.685</b>	4.854	6.302	8.076	10.225
Find the pressure at temper	ature $t = 142^{\circ}$	C and $t =$	175 ° C	~~~
22. Apply Gauss's forward formul	a to find $f(x)$	at $x = 3.5$ fr	om the table belo	w CO3
<b>x</b> : $2 f(x)$ : $2 f(2)$	3 3 454	4 4 784	5 6 986	
	5.151	1.701	0.200	
Anguan any ONE Amation	S	SECTION -	– D	1 V 12 - 12 Martia
Answer any ONE Question: 23 Find the values of v at $v = 21$	and $x = 28$ from	m the follow	vina data	$1 \land 12 = 12 \text{ Marks}$
x: 20 23	26 21 x = 20		29	005

y :

24. Evaluate of π. **CO4** 

Can you use other formulae in this case.

## VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234

		D	EPARTMENT OF	PHYSICS			
	Course Code:	06CT61	Programme:	B.Sc. Physics	CIA:	II	
	Date:	09.03.2023	Part:	III	Semester:	VI	
	Duration:	2 Hours	Academic Year:	2022-23	Max. Marks:	50	
HANDHEARTHEAD	Study Compo	nent:	Core				
	<b>Course Title:</b>	NUCLEAR P	PHYSICS				

#### **SECTION – A (Remembering)**

Answer ALL the Ouestions: $(10 \times 1 = 10)$	Marks)
	<b>GO</b>
I The beta ray spectrum is a continuous spectrum while the others are	CO2
a) cylindrical spectra b) line spectra c) spherical spectra d) emission spectra	000
2 Who developed a theory to explain the continuous $\beta$ – ray spectrum in 1934?	CO2
a) Newton b) Rutherford c) Fermi d) Bonr	000
3 The half-life period of a radioactive substance is defined as the time required forof the	CO2
radioactive substance to disintegrate	
a) one-fourth b) one – half c) one – third d) one-fifth	000
4 The mean life of a radioactive substance is the reciprocal of the decay constant	<b>CO</b> 2
a) M b) N c) T d) $\lambda$	~ ~ ~
5 The first transmutation of nitrogen in to oxygen was achieved and established by	CO3
a) Rutherford b) Newton c) Bohr d) Maxwell	
6 A large number of isotopes are obtained from nuclear reactors by the process	CO3
a) electron radiative b) proton radiative c) neutron radiative d) deuteron radiative	
7 For an exoergic reaction	CO3
a) $Q > 0$ b) $Q < 0$ c) $Q = 0$ d) Kinetic energy = 0	
8 Brain and thyroid tumors are detected using	CO3
a) $I^{131}$ b) $P^{32}$ c) $Co^{60}$ d) $S^{35}$	
9 The half-life of neutron is	CO3
a) 13 hours b) 13 minutes c) 13 seconds d) 13 days	
<b>10</b> In which of the following process are Neutrons emitted?	CO4
a) inverse beta decay b) nuclear fission c) spontaneous Fission d) nuclear fusion	
<b>SECTION – B (Remembering)</b>	
Answer any <b>FIVE</b> Questions: $(5 \times 2 = 10)$	Marks)
11 Write a short note on Beta ray spectra.	<b>CO2</b>
12 State the law of radioactive disintegration constant.	CO2
13 Define the term mean-life period.	CO2
14 Define threshold energy for a nuclear reaction.	CO3
15 Differentiate between slow neutrons and fast neutrons.	CO3
16 Mention the two broad methods of preparation of radioelements.	CO3
17 What do you understand by the term "nuclear fission"?	CO4
SECTION – C (Understanding)	
Answer any <b>THREE</b> Ouestions: (3 X 6= 18	Marks)
18 With a neat diagram, explain the magnetic spectrograph in beta ray spectrum.	CO2
<b>19</b> Give an account of the discovery of artificial transmutation by Rutherford and the Bohr's	CO3
theory of nuclear disintegration.	
20 Elucidate various applications of radioisotopes.	CO3
21 Write a concise account of the production and detection of neutrons.	CO3
22 The O value of the Na ²³ (n, $\alpha$ ) $F^{20}$ reaction is -5.4 MeV. Determine the threshold energy of	CO3
the neutrons for this reaction	
SECTION – D (Applying)	
Answer any <b>ONE</b> Ouestion: $(1X 12=12)$	Marks)

	2			
23	Elucidate	e the discovery of neutrons and enunciate the basic properties of neutror	18.	CO3
24	Describe	the construction and working of a nuclear reactor along with its uses.		<b>CO4</b>

#### VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234

		DEP	ARTMENT OF PH	IYSICS		
~~~~	<b>Course Code:</b>	06EP61	Programme:	B.Sc. Physics	CIA:	II
	Date:	10.03.2023	Part:	III	Semester:	VI
	Duration:	2 Hours	Academic Year:	2022-23	Max. Marks:	50
HANDHEARTHEAD	Study Compo	nent:	Elective			
	Course Title:	QUANTUM I	MECHANICS & R	ELATIVITY		.Ł
Answer	AII the questions		SECTION – A	(10	V 1 – 10 Monka)	
1 Heisen	herg Uncertainty p	· rinciple is given	hv	(10	A I = IU Warks)	72
a) Ax	$\Delta n = h/2\pi$	b) $\Delta x \Delta n = h/41$	τ c) $\Delta x \Delta n > h/4$	π d) Ax/	$\ln > h/2\pi$	52
2 Electro	ons are emitted from $\frac{1}{2}$	n a metal surface	e when light falling or	$\frac{1}{1}$ it has a minimum	2p <u>-</u> π - π	02
a) Ene	ergy	b) Wavelength	c) Velocity	d) Cha	rge	-
3. The rel	ation between phas	e velocity and g	roup velocity for a no	n-relativistic free parti	cle CC	02
a)12.	$=\frac{v_g}{v_g}$	b) $v_{n} = v_{n}$	$c_{1} v_{2} v_{3} = 0$	d)12., =	$=\frac{v_g}{v_g}$	
4 Thoun	2	$v_p = v_g$	<i>c)vpvg</i> =0	a)vp	3 C(י ר
4. The un	eroscopic particles of	olds for	h) Macrosconi	c particles only]4
c) Mic	roscopic and macro	osconic narticles	both d) Neither mic	roscopic por macrosco	nic narticles	
5. The ex	pression for the lo	west energy state	e for the electron of th	e hydrogen atom.	pie purificies Cl	03
-) <i>Г</i>	me ⁴	me^2	$\sim \Gamma$ me	1) E	me ⁴	
a) E_1 =	$=-\frac{1}{8\epsilon_0^2 h^2}$	b) $E_1 = -\frac{1}{8\epsilon_0^3 h^2}$	c) $E_1 = -\frac{1}{8h\epsilon_0^2}$	$a)E_1 =$	$8\epsilon_0^2 h^2$	
6. A norr	malized wave funct	ion obeys the eq	uation		CC)3
a) $\int_{-\infty}^{\infty}$	$ \psi ^2 dV = 0$	b) $\int_{-\infty}^{\infty} \psi ^2 dV$	$f=1$ c) $\int_{-\infty}^{\infty} \psi dV =$	$= 0$ d) $\int_{-\infty}^{\infty}$	$_{\circ} \Psi dV = 1$	
7. The sc	uare of the absolut	e magnitude of v	vave function $ \psi ^2$ is	s always a qu	antity. CC)3
a) pos	sitive real	b) negative rea	l c) zero	d) unit	y	
8. Accord	ling to quantum mecl	nanics, the energy	levels of a particle exec	cuting one dimensional S	.H.M are CO	03
a) C	ontinuous		b) Dis	crete but equispaced		
c) D	iscrete but non equ	ispaced	d) Not	hing can be said		
9. The ele	ectron orbit in a gro	und state hydrog	gen atom is in circumf	ference equal to	CO)3
a) On	e de-Broglie wavel	ength	b) One	e de-Broglie wavelengt	th	
c) 10	de-Broglie waveler	ngth	d) 100) de-Broglie wavelengt	h	
10. The w	vave functions asso	ciated with a ma	terial particle is		CC)4
a) On	ly finite		b) Onl	y continuous		
c) On	ly single valued		d) Fini	ite continuous and sing	le valued	

SECTION – B

Answer any FIVE Questions:	(5 X 2 = 10 Marks)
11. State the principle behind the double slit experiment.	CO2
12. State Heisenberg's uncertainty principle.	CO2
13. Give the expression for group velocity and wave number.	CO2
14. What do you mean by degeneracy?	CO3
15. Define orthogonal wave function.	CO3
16. How do you calculate Reflectance and Transmittance?	CO3
17. Write the postulate of quantum mechanics relating the state of a system.	CO4

SECTION – C

Answer any THREE	Questions:	(3 X 6= 18 Marks)
18. Prove the nonexist	tence of electron in the nucleus on the basis of uncertainty princip	le. CO2
19. Calculate the perm	itted energy level of an electron, in a box 1 A^0 wide.	CO3
20. Calculate the expect	tation value $\langle p_x \rangle$ of the momentum of a particle trapped in a one-dime	nsional box. CO3
21. Write notes on mo	mentum operator.	CO3
22. List the properties	of wave function. (or) Mention the physical significance of wave	function. CO3

SECTION – D

Answer any ONE Question:

(1X 12= 12 Marks)

23. What is a potential step? Find the amplitude of reflected and transmitted beam in terms of incident wave.
24. Determine the energy level of a particle in three dimensional square well.
CO4

		DEPART	MENT OF PHYSIC	S	407	
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Course Code:	06SB61	Programme:	B.Sc. Physics	CIA:	I
	Date:	02.03.2023	Part:	IV	Semester:	v
	) Duration:	1 Hour	Academic Year:	2022-23	Max. Marks:	2:
AND HEART HEAD	Study Compo	nent:	Skill Based			
	Course Title:	NANO TECH	INOLOGY			
			SECTION – A			
Answer.	ALL the Questions:				(5 X 1 = 5 Mar	ks)
1	Solids are classified i	nto crystalline so	olids andbase	d on the arrangeme	ent of atoms <b>CC</b>	2
	and molecules.					
	a)conductors b) insu	lators c) semice	onductors d) amorpho	ous solids		
2	The coordination nun	nber of a NaCl cr	rystal is		CO	2
	a)4 b)6	c)12	d)8			
3	An example for Hexa	gonal close pack	ted structure is		CO	2
	a)Quartz b)Lead	l c)Gold	d)silver			
4	Sol-gel method is	approach			CO	3
	a) Bottom up b) Up	bottom c) Top	down d) Down top			
5	The process of modif	ying a metal's pr	operties is called		CO	3
	a) Electrolysis b) Ele	ctro deposition	c) Electro less plating	d) Electroplating		
			SECTION – B			
Answer	any <b>TWO</b> Questions:				(2 X 2 = 4 Mar	ks)
6	What is a crystal?				CO	2
7	List out the seven cry	stal system			CO	2
8	Define Bravais lattice	2.			CO	2
9	Define unit cell.				CO	2
			SECTION – C			
Answer	any <b>ONE</b> Question:				(1 X 6= 6 Mar	ks)
10	Sketch out the seven	crystal system ar	nd fourteen Bravais lat	ttice.	CO	2
11	Explain about the var	ious crystal bond	ling.		CO	2
			SECTION – D			
Answer	any <b>ONE</b> Question:				(1 X 10= 10 Mar	ks)
12	Discuss briefly about	some important	crystal structures.		CO	2
13	Write down the role of	of Bottom-up and	l Top – down approac	h in nanotechnolog	y CO	3

#### VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234 DEPARTMENT OF PHYSICS

		DEFARIT	MENT OF PHISIC	,D		
	Course Code:	06SB62	Programme:	B.Sc. Physics	CIA:	II
	Date:	03.03.2023	Part:	IV	Semester:	VI
	Duration:	1 Hour	Academic Year:	2022-23	Max. Marks:	50
HANDHEARTHEAT	Study Compor	ient:	Skill Based			
	<b>Course Title:</b>	PHYSICS FO	OR COMPETITIVE	E EXAMINATIO	NS	

Answer ALL the Questions:

#### (5 0 X 1 = 50 Marks)

**CO3** 

- 1. The law that governs the force between electric charges is called
  - A. Ampere's law B. Coulomb's law C. Faraday's law D. Ohm's law
- 2.  $F_g$  and  $F_e$  represent the gravitational and electrostatic forces respectively between electrons situated at some distance. The ratio of  $F_g/F_e$  is of the order of A. 1 B. 10 C.  $10^{-43}$  D.  $10^{-37}$
- 3. When the distance between two charged particles is halved, the force between them becomes A. one-fourth B. one-half C. double D. four times
- 4. Which one of the following is the unit of electric charge?A. Coulomb B. Newton C. volt D. Coulomb/volt
- 5. The magnitude of electric field intensity (strength) E is such that an electron placed in it would experience an electrical force equal to its weight is given by
  A. mge B. mg/e C. e/mg D. e²g/m²
- 6. A diople of electric dipole moment P is placed in a uniform electric field of strength E. If  $\theta$  is the angle between positive directions of P and E, then the potential energy of the electric dipole is largest when  $\theta$  is A. zero B.  $\pi/2$  C.  $\pi$  D.  $\pi/4$
- 7. An electric dipole of moment P is placed in the position of stable equilibrium in uniform electric field of intensity E. The couple required to rotate it through an angle θ from the initial position is
  A. PE cosθ B. PE sinθ C. PE tanθ D. PE cosθ
- 8. Charges reside on the

A. outer surface of the charged conductor B. inner surface of the charged conductor C. inner as well as outer surface of the charged conductor D. neither inner nor outer surface

- 9. Electric potential due to a point charge and a dipole respectively are directly proportional to A. r⁻¹, r⁻² B. r¹, r⁻¹ C. r⁻², r⁻³ D. r⁻², r⁻²
- 10. The velocity of an electron which passes through a potential difference of 1000 volts is A.  $1.87 \times 10^7 \text{ m/s}$  B.  $18.7 \times 10^7 \text{ m/s}$  C.  $0.187 \times 10^7 \text{ m/s}$  D.  $187 \times 10^7 \text{ m/s}$
- 11. Which one of the following relations is correct?
- A. V=q/C B. C=Vq C. V=qC D. q=V/C
- 12. No current flows between two charged bodies when connected together, if they have A. the same charge B. the same capacitance C. the same potential D. none of the above
- 13. A condenser is charged through a potential difference of 200 volts and possesses a charge of 0.1 Coulomb. When discharged it would release an energy of A. 1 J B. 2 J C. 10 J D. 20 J
- 14. Two capacitors of 4  $\mu F$  are joined in parallel. The resultant capacitance of combination is A. 8  $\mu F~$  B. 4  $\mu F~$  C. 2  $\mu F~$  D. 1  $\mu F~$
- 15. Three condensers of capacitances 10, 20 and 30 μF are first connected in series and then connected in parallel. The ratio of the resultant capacitances in the two cases isA. 1:11 B. 11:1 C. 1:6 D. 6:1

- 16. The capacity of a parallel plate capacitor is 4 μF. The distance between the plates is doubled. The new capacity is
  A. 8 μF B. 4 μF C. 2 μF D. 1 μF
- 17. The effective resistance of three resistances 2  $\Omega$ , 4  $\Omega$  and 6  $\Omega$  connected in parallel is A. 12/11  $\Omega$  B. 11/12  $\Omega$  C. 12  $\Omega$  D. 0  $\Omega$
- 18. n similar resistors each of resistance r when connected in parallel has the total resistance R. When these resistances are connected in series, the total resistance will be
  A. n²R B. nR C. R/n D. R/n²
- 19. In a Wheatstone bridge the resistances in the ratio arms are 100  $\Omega$  and 150  $\Omega$  respectively. If R= 80  $\Omega$ , the resistance of the fourth arm will be A. 120  $\Omega$  B. 80  $\Omega$  C. 150  $\Omega$  D. 70  $\Omega$
- 20. Kirchoff's first law at a junction deals withA. conservation of charge B. conservation of energy C. conservation of momentumD. conservation of angular momentum
- 21. Magnetic effect of current was discovered by A. Faraday B. Oersted C. Ampere D. Bohr
- 22. The magnetic field at a point due to a current carrying conductor is directly proportional to A. resistance of the conductor B. thickness of the conductor C. current flowing through the conductor D. distance from the conductor
- 23. Two free parallel wires carrying currents in the opposite directionA. attract each other B. repel each other C. do not affect each other D. get rotated to be perpendicular to each other
- 24. Which one of the following statements is wrong?
  - A. A voltmeter should have high resistance B. An ammeter should have low resistance
  - C. An ammeter is placed in parallel across the conductor and voltmeter in series in the circuit
  - D. An ammeter is placed in series and voltmeter in parallel across the conductor in the circuit
- 25. The current in an inductor is reduced to half. The energy stored in itA. is doubled B. reduces to one-fourth of its initial value C. remains unchangedD. reduces to half of its initial value
- 26. Lenz's law is a consequence of the law of conservation ofA. mass B. energy C. momentum D. charge
- 27. The velocity of certain ions that pass undeflected through crossed E and B fields for which E = 7.7 kV/m and B = 0.14 T
  A. 22 km/s B. 33 km/s C. 44 km/s D. 55 km/s
- 28. A coil of 20 turns has an area of 800 mm² and bears a current of 0.5 A. It is placed with its plane
- parallel to a magnetic field of intensity 0.3 T. The torque on the coil is A. 2.4 X  $10^{-1}$  N-m B. 2.4 X  $10^{-2}$  N-m C. 2.4 X  $10^{-3}$  N-m D. 2.4 X  $10^{-4}$  N-m
- 29. In a potentiometer experiment when the galvanometer shows no deflection, then no current flows in

A. potentiometer wire B. galvanometer circuit C. main circuit D. battery

30. In a potentiometer, the length of its wire is doubled. The accuracy in determining the null point will

A. decrease B. increase C. remain unchanged D. none of the above

- 31. Thermoelectric effect was discovered by
- A. Thomson B. Peltier C. Seebeck D. Maxwell
- 32. When different parts of a metal are kept at different temperatures and current is passed through it, the heat is either evolved or absorbed. The effect is called

A. Peltier effect B. Seebeck effect C. Thomson effect D. none of the above

33. A straight line conductor of length 0.4 m is moved with a speed of 7 m/s perpendicular to a magnetic field of intensity 0.9 wb/m². The induced e.m.f. across the conductor is
A. 5.04 V B. 1.26 V C. 2.52 V D. 25.2 V

- 34. The knowledge of electromagnetic induction has been used in the construction of A. electric motor B. generator C. voltmeter D. galvanometer
- 35. An electric motorA. generates electric energy B. generates mechanical energy C. converts mechanical energy into electrical energy D. converts electrical energy into mechanical energy
- 36. Which of the following phenomena is utilised in the construction of the mouth-piece of a telephone?

A. electromagnetic induction B. heating effect of electric current C. change of resistance with temperature D. none of the above

- The particle accelerator that uses the phenomenon of e.m. induction is the A. betatron B. cyclotron C. Cockcroft-Walton generator D. Van de Graff generator
- 38. To step up the voltage, the number of turns in the secondary should beA. less than the number of turns in the primary B. greater than the number of turns in the primaryC. equal to the number of turns in the primaryD. infinite
- 39. Core of a transformer is made of soft iron and laminated to A. reduce the heat loss B. reduce the eddy current loss C. reduce circuit permeability D. make assembly cheap and convenient
- 40. Choke coil works on the principle of

A. self-induction B. mutual induction C. dynamically induced e.m.f. D. none of the above

- 41. If  $E_{rms}$ , be the R.M.S value of e.m.f, then its peak-to-peak value is given by A.  $E_{rms}/\sqrt{2}$  B.  $\sqrt{2} E_{rms}$  C.  $2\sqrt{2} E_{rms}$  D.  $E_{rms}/2$
- 42. Alternating current is converted to direct current by A. motor B. dynamo C. transformer D. rectifier
- 43. Reactance offered by a coil having no resistance in an a.c. circuit is equal to A.  $\omega L = B \cdot 1/\omega L = C \cdot \omega^2 L^2 = D \cdot \omega L R$
- 44. With high frequencies capacitive reactance

A. decreases B. increases C. remains unchanged D. none of the above

45. The natural frequency of an LC circuit is equal to

A. 
$$\frac{\sqrt{LC}}{2\pi}$$
 B.  $\frac{1}{2\pi\sqrt{LC}}$  C.  $\frac{1}{2\pi}\sqrt{\frac{L}{C}}$  D.  $\frac{1}{2\pi}\sqrt{\frac{L}{L}}$ 

46. In an LCR A.C. Circuit, the impedance is equal to

A. 
$$\sqrt{R^2 + (X_L^2 - X_C)^2}$$
 B.  $\sqrt{R^2 + (X_L - X_C)^2}$  C.  $R + (X_L + X_C)$  D.  $R + (X_L - X_C)$ 

47. A pure inductive coil is that which has

A. some ohmic resistance B. no impedance C. no ohmic resistance D. none of the above

48. An inductance of 0.4 Henry and a resistance of 100  $\Omega$  are connected in series with an A. C. supply of 220 volts, 50 c.p.s. Phase lag of current from e.m.f. applies is

A.  $\tan^{-1}(0.4\pi)$  B.  $\tan^{-1}(\pi)$  C.  $\tan^{-1}(4\pi)$  D.  $\tan^{-1}(0.2\pi)$ 

49. A student has a coil of 3 mH and wishes to construct a circuit whose resonant frequency is 1000 kHz. The value of capacitor he must use is about (pico=10⁻¹²)

A. 8.5 pico farad B. 0.8 pico farad C. 85 pico farad D. 850 pico farad

50. In an LCR-series circuit  $R = \sqrt{3} \Omega$ ,  $X_L = 10 \Omega$ ,  $X_C = 11 \Omega$ , the applied voltage is 10 Volt (R.M.S). The impedance of the circuit is A. 8  $\Omega$  B. 4  $\Omega$  C. 2  $\Omega$  D. 1  $\Omega$ 

#### VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234 **DEPARTMENT OF PHYSICS** Course Code: 06SB63 **B.Sc.** Physics CIA: **Programme:** Π Date: 04.03.2023 IV VI Part: Semester: **Duration**: 1 Hour **Academic Year:** 2022-23 Max. Marks: 25 **Study Component:** Skill Based **Course Title: MEDICAL INSTRUMENTATION SECTION-A** Answer ALL the questions: 5 X 1 = 5 Marks 1. Study of electrical activity of heart muscles is **CO2** d) MRI a) EEG b) ECG c) PET 2. The outer layer of the brain is called ______ **CO3** b) skull c) cerebral cortex d) cerebellum a) cerebrum 3. On the surface of the brain, the voltage is about _____ mV. **CO3** a) 5 b) 10 c) 15 d) 100 4. _____ is a symptom for brain damage. **CO3** a) Tumor b) Brain death c) Epilepsy d) none of the above 5. Servo Controlled Ventilators work in _____ mode. **CO4**

## SECTION-B

b) Assisted-control

a) Assisted

c) Controlled

d) Pressure control

Answer any TWO questions:	2 X 2 = 4 Marks	
6. What is the duty of Sinoatrial (SA) node?	CO2	
7. What is called Epilepsy?	CO3	
8. What do you mean by REM sleep?	CO3	
9. What is the main use of operation theatre equipment?	CO4	

#### **SECTION-C**

Answer any ONE questions:	1 X 6 = 6 Marks	
10. With diagram briefly explain anatomy of the brain.	CO3	
11. Draw the diagram of brain waves with frequency ranges.	CO3	

#### SECTION-D

Answer any ONE questions:	1 X 10 = 10 Marks	
12. With diagram explain about placement of electrodes.	CO3	
13. Discuss about various electro-surgery techniques using diathermy unit.	CO4	

		DEPARTI	MENT OF PHYSIC	S		
	Course Code:	06SE41	Programme:	B.Sc. Physics	CIA:	II
	Date:	03.03.2023	Part:	IV	Semester:	IV
	Duration:	1 Hour	Academic Year:	2022-23	Max. Marks:	25
AND HEART HEAD	Study Compo	nent:	Skill Enhanceme	ent Course		
	Course Title:	ASTROPHY	SICS			
			SECTION – A			
Answer A	LL the Questions:				(5 X 1 = 5 Mark	s)
<b>1</b> T	The dark region of the	e sunspot is			CO	2
a	)chromosphere b) ur	nbra c) photos	phere d) transition re	gion		
<b>2</b> T	The temperature of th	e corona is			CO	2
a	)15 MK b) 2	MK c) 4 MK	d) 6 MK			
3 0	Central part of the sur	n is called as			CO	2
a	)corona b) photos	phere c) core d	) solar flare			
<b>4</b> A	white dwarf is	_star			CO	3
a	)new born b) dead	c) living d) u	ndetermined			
5 A	A star emits its maxir	num energy at	wavelength		CO	3
a	) short b)long	c)medium d)ra	atio			
			SECTION – B			
Answer an	ny <b>TWO</b> Questions:				(2 X 2 = 4 Mark)	(s)
6 S	un is a star – Justify				CO	2
7 V	What is the Photosphere	ere?			CO	2
<b>8</b> D	Define Protostar.				CO	3
9 L	ist out the different	stages of stellar e	evolution.		CO	3
			SECTION – C			
Answer a	ny <b>ONE</b> Question:				(1 X 6= 6 Mark	(s)
<b>10</b> E	Explain the concept o	f Solar wind.	_		CO	2
<b>11</b> D	Derive an expression	for luminosity of	f a star.		CO	3
			SECTION – D			`
Answer a	ny <b>UNE</b> Question:				(1 X 10 = 10 Mark)	(S)
12 E	explain Sunspot cycle	<i>t</i> .			CO	4

12Explain Sunspot cycle.CO 213Explain about the structure of the sun with neat diagram.CO 2