VIVEKANANDA COLLEGE, TIRUVEDAKAM WEST - 625234

|  | DEPARTMENT OF PHYSICS |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Course Code: | 06AE02 | Programme: | B.Sc. Maths/ Chemistry | CIA: | I |
|  | Date: | 25.01.2023 | Part: | III | Semester: | II |
|  | Duration: | 2 Hours | Academic Year: | 2022-23 | Max. Marks: | 50 |
|  | Study Component: |  | Ability Enhancement Course |  |  |  |
|  | Course Title: | ALLIED PHYSICS - II |  |  |  |  |

## SECTION - A (Remembering)

Answer ALL the Questions:
(10 X 1 = 10 Marks)
1 The relation between the path and phase difference is given by
a)Phase difference $=4 \pi / \lambda \times$ path difference
b) Phase difference $=3 \pi / \lambda \times$ path difference
c) Phase difference $=\pi / \lambda \times$ path difference
d) Phase difference $=2 \pi / \lambda \times$ path difference

2 The condition for brightness in the reflected system is
a) $2 n t \operatorname{cosr}=(2 m+1) \lambda / 2$
b) $2 n t \sin r=(2 m+1) \lambda / 2$
c) $2 \mathrm{nt} \operatorname{cosr}=(2 m+1) \lambda / 4$
d) $2 n t \cos r=(2 m+1) \lambda / 6$

3 The phenomenon of bending of light waves around corners and their spreading
CO1 into thegeometrical shadow of an object is called
a)Interference
b) Polarization
c) Diffraction
d) Reflection

4 The unit of specific rotatory power is
CO1
a) deg. $\mathrm{dm}^{-1}(\mathrm{gm} / \mathrm{cc})^{-1}$
b) $\operatorname{deg} \cdot \mathrm{dm}^{-1}(\mathrm{gm} / \mathrm{cc})^{-2}$
c) deg.dm $\left.{ }^{-1}(\mathrm{gm} / \mathrm{cc})^{-3} \mathrm{~d}\right)$ deg. $\cdot \mathrm{dm}^{-1}(\mathrm{gm} / \mathrm{cc})^{-4}$

5 The space in between any two lines is transparent to
CO1
a)Sound
b) Light
c) Velocity
d) Frequency

6 The points in the consecutive slits separated by the distance is
CO1
a) $a / b$
b) $\mathrm{a} \times \mathrm{b}$
c) $a+b$
d) $a-b$

7 The film appears dark is
CO1
a) $2 n$ tcosr $=m \lambda$
b) $2 \mathrm{ntsinr}=\mathrm{m} \lambda$
c) $2 \mathrm{ntcotr}=m \lambda$
d) $2 n t \operatorname{cosr}=\lambda$

8 Isotopes have same number of protons but different number of
CO 2
a) electrons
b) neutrons
c) shells
d) positrons

9 The size of the atom is of the order of
CO2
a) $10^{-14} \mathrm{~m}$
b) $10^{-10} \mathrm{~m}$
c) $10^{-8} \mathrm{~m}$
d) $10^{-6} \mathrm{~m}$

10 The vector atom model is an extension of
CO 2
a) Bohr atom model
b) Rutherford atom model
c) Bohr- Sommerfeld atom model
d) none of these

## SECTION - B (Remembering)

Answer any FIVE Questions:
(5 X 2 = 10 Marks)
11 What is diffraction grating?
CO1
12 Compare between Fresnel and Fraunhofer diffraction. $\mathbf{C O 1}$
13 What is interference? CO1
14 Define specific rotator power. $\mathbf{C O 1}$
15 Calculate the specific rotation if the plane of polarization is turned through $26.4^{0}$, traversing $\mathbf{C O 1}$ 20 cm length of $20 \%$ sugar solution.
16 Give the two concepts of vector atom model
CO2
17 Write the maximum number of electrons in the $\mathrm{K}, \mathrm{L}, \mathrm{M}, \mathrm{N}$ and O shell

Answer any THREE Questions:
18 Differentiate between Interference and diffraction.
19 Describe the theory of working of plane transmission grating.
CO1
20 A Parallel beam of sodium light $\left(\lambda=589 \times 10^{-9} \mathrm{~m}\right)$ is incident on a thing glass plate CO1 $(\mathrm{n}=1.5)$ such that the angle of refraction into the pate is $60^{\circ}$. 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.

## 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 model. CO2
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| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Course Code: | 06CT21 | Programme: | B.Sc. Physics | CIA: | I |
|  | Date: | 20.01.2023 | Part: | III | Semester: | II |
|  | Duration: | 2 Hours | Academic Year: | 2022-23 | Max. Marks: | 50 |
|  | Study Component: |  | Core Course |  |  |  |
|  | Course Title: | THERMODYNAMICS AND STATISTICAL MECHANICS |  |  |  |  |

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
$\mathrm{CO1}$
a) J/kg.K
b) $\mathrm{J} / \mathrm{mol}$.K
c) $\mathrm{J} . \mathrm{ohm} / \mathrm{sec} . \mathrm{K}^{2}$
d) $\mathrm{W} / \mathrm{m} . \mathrm{K}$

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 body

6 The value of the wavelength for maximum emissive power is given by
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
CO 2
a) pressure
b) volume
c) intermolecular forces
d) temperature

9 Joule Thomson effect describes gases CO 2
a) contraction b)
b) sudden expansion
c) expansion
d) relaxation

10 In Porous plug experiment the change in temperature of a gas depends upon
a) its molecular weight
b) its specific heat
c) pressure gradient on either side
d) all of the above

## SECTION - B (Remembering)

Answer any FIVE Questions:

## SECTION - C (Understanding)

Answer any THREE Questions:
(3 X 6 = 18 Marks)
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 of $100^{\circ} \mathrm{C}$ and the area of the plate is $200 \mathrm{sq} . \mathrm{cm}$. Find the quantity of the heat that will flow through the plate in one minute if $\mathrm{K}=0.2$ CGS units.
21 Describe porous plug experiment. What conclusions have been drawn from it?
22 Calculate the Van der Waals constants for dry air, given that $\mathrm{T}_{\mathrm{c}}=132 \mathrm{~K}, \mathrm{P}_{\mathrm{c}}=37.2$ atmospheres and R per mole $=82.07 \mathrm{~cm}^{3}$ atmos $\mathrm{K}^{-1}$.

## SECTION - D (Applying)

Answer any ONE Question:
23 Discuss in detail Forbes method for finding the coefficient of thermal conductivity of a CO1 metal bar.
24 Derive Van der Waals equation of state and use it to obtain the expressions for the critical CO 2 constants in terms of the constants of the Van der Waals equation.
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|  | Course Code: | 06CT22 | Programme: | B.Sc. Physics | CIA: | I |
|  | Date: | 24.01.2023 | Part: | III | Semester: | II |
|  | Duration: | 2 Hours | Academic Year: | 2022-23 | Max. Marks: | 50 |
|  | Study Component: |  | Core Course |  |  |  |
|  | Course Title: | OPTICS AND SOUND |  |  |  |  |

## SECTION - A (Remembering)

AnswerALLthe Questions:
( 10 X 1 = 10 Marks)
1 The phase difference for constructive interference
a) $0,2 \pi, 4 \pi$
b) $\pi, 3 \pi, 5 \pi$
c) $0, \pi / 2, \pi, 3 \pi / 2$
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) $\frac{A D}{d}$
b) $\frac{\lambda d}{D}$
c) $\frac{D}{\lambda d}$
d) $\frac{d}{\partial D}$

4 The equation $\mathrm{f}=\mathrm{f}_{\mathrm{o}} \sqrt{1-u^{2} / c^{2}}$ states that .......Doppler effect.
CO1
a) longitudinal
b) transverse
c) coherent
d) zero

5 The phase relationship between two waves does not change with time is called
CO1
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 means 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
a) interference
b) diffraction
c) polarization
d) refraction

9 The intensity in single slit diffraction is $\mathrm{I}_{\theta}=$
CO2
a) $I_{m}(\sin \alpha / \alpha)^{2}$
b) $I_{m}(\operatorname{Cos} \alpha / \alpha)^{2}$
c) $I_{m}(\tan \alpha / \alpha)^{2}$
d) $I_{m}(\sin \alpha / \alpha)$

10 Each part of hologram contains information about
CO 2
a) entire object
b) particular part of the object
c) important part of the object
d) front side of the object

## SECTION - B (Remembering)

Answer any FIVEQuestions:
11 Define the term interference
12 Define destructive interference
13 State Doppler effect

14 What is coherence? $\mathbf{C O 1}$
15 What is an interferometer?
CO1
16 Define resolving power of the grating. $\mathbf{C O 2}$
17 State Bragg's law.
CO2

## SECTION - C (Understanding)

Answer any THREEQuestions:
(3 X $6=18$ 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 $(\lambda=546 \mathrm{~nm})$ 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.

## SECTION - D (Applying)

Answer anyONE Question:
(1X 12= 12 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.
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|  | Course Code: | 06CT41 | Programme: | B.Sc. Physics | CIA: | I |
|  | Date: | 20.01.2023 | Part: | III | Semester: | IV |
|  | Duration: | 2 Hours | Academic Year: | 2022-23 | Max. Marks: | 50 |
|  | Study Component: |  | Core Course |  |  |  |
|  | Course Title: | ANALOG ELECTRONICS |  |  |  |  |

## SECTION - A

Answer ALL the Questions:
( $10 \times 1$ X 10 Marks )
1 A crystal diode has forward resistance of the order of. CO 1
a) $\mathrm{k} \Omega$
b) $\Omega$
c) $\mathrm{M} \Omega$
d) $m \Omega$

2 The knee voltage of a crystal diode is approximately equal to CO 1
a) applied voltage
b) breakdown voltage
c) forward voltage
d) barrier potential

3 A crystal diode is used as
CO 1
a) an amplifier
b) a rectifier
c) an oscillator
d) a voltage regulator

4 When the crystal diode current is large, the bias is $\qquad$ CO 1
a) forward
b) inverse
c) poor
d) reverse
d)

5 A Zener diode is used as $\qquad$
a) an amplifier
b) a voltage regulator
c) a rectifier
d) a multivibrator

6 The ripple factor of a half - wave rectifier is
a) 2
b) 1.21
c) 2.5
d) 0.48

7 The maximum efficiency of a half - wave rectifier is CO 1
a) $40.6 \%$
b) $81.2 \%$
c) $50 \%$
d) $25 \%$

8 A transistor has $\qquad$

9 The input impedance of a transistor is $\qquad$
a) high
b) low
c) very high
d) almost zero

10 In a transistor,
a) $I_{c}=I_{E}+I_{B}$
b) $I_{B}=I_{C}+I_{E}$
c) $I_{E}=I_{C}-I_{B}$
d) $I_{E}=I_{C}+I_{B}$

SECTION - B
Answer any FIVE Questions:
11 Define ripple factor.
CO 1
12 What is a zener diode?
CO 1
13 What are the advantages of full wave bridge rectifier?
CO 1
14 Define peak inverse voltage. CO 1
15 What is filter circuit? CO 1
16 Draw the symbol for NPN transistor and PNP transistor. CO 2
17 Define Q-point of a transistor. CO 2

## SECTION - C

Answer any THREE Questions:
(3 X 6= 18 Marks)
18 Derive an expression for the efficiency of a half wave rectifier and find its value. CO 1
19 Compare the different rectifier circuits. CO 1
20 Explain how zener diode act as voltage stabilizer? CO 1
21 In a CE transistor circuit, $\mathrm{V}_{\mathrm{CC}}=12 \mathrm{~V}$ and $\mathrm{R}_{\mathrm{C}}=6 \mathrm{k} \Omega$, draw the d.c. load line. What will be $\mathbf{C O} 2$ the Q point if zero signal base current IB is $20 \mu \mathrm{~A}$ and $\beta=50$ ?
22 Explain the following terms of a transistor i) current gain ii) voltage gain and iii) power $\mathbf{C O} 2$ gain.

SECTION - D
Answer any ONE Question:
(1X 12= 12 Marks)
23 Explain the working of full wave bridge rectifier with neat circuit diagram.
24 Describe a transistor as an amplifier in CE arrangement.

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|  | Course Code: | 06CT42 | Programme: | B.Sc. Physics | CIA: | I |
|  | Date: | 24.01.2023 | Part: | III | Semester: | IV |
|  | Duration: | 2 Hours | Academic Year: | 2022-23 | Max. Marks: | 50 |
|  | Study Component: |  | Core Course |  |  |  |
|  | Course Title: | NUMERICAL METHODS |  |  |  |  |

## SECTION - A

## Answer All the questions:

10 X 1 = 10 Marks

1. $f(x)=2 x^{3}-9 x^{2}+12 x+6$ is a polynomial of degree

CO1
a) two
b) three
c) one
d) four
2. $f(x)=a+b e^{x}+c \sin x+d \log x$ is an example of

CO1
a) algebraic equation
b) polynomial equation
c) transcendental equation
d) linear equation
3. Find the odd one out
$\mathrm{CO1}$
a) Bisection method
b) Bolzano's method
c) Interval halving method
d) Regula-Falsi method
4. Newton Raphson method is also called

CO1
a) Method of tangents
b) Method of Chords
c) Bisection method
d) All the above
5. In the Regula - False method we approximate the curve of the function $f(x)$ by a $\qquad$ .

CO1
a) Tangent
b) Chord
c) Normal
d) Pair of tangents
6. Bisection method is also known as

CO1
a) Regular false method
b) Bolzano method
c) Method of false position
d) Method of tangents
7. Choose the transcendental equation from the following $\qquad$ .

CO1
a) $x^{3}-1=0$ b) $x^{2}+x+1=0$ c) $x=1$
d) $e^{x}-1=0$
8. In Gauss-Elimination method the given matrix is converted in to

CO 2
a) unit matrix
b) upper triangular matrix
c) null matrix
d) lower triangular matrix
9. The fastest method of solving Simultaneous Linear Algebraic equation is
a) Gauss-Elimination method
b) Gauss-Jordan method
c) Gauss-Seidal method
d) All the above
10. Gauss elimination and Gauss Jordan methods are _.
a) iterative
b) interpolation
c) direct
d) indirect

## SECTION - B

Answer any FIVE Questions:
5 X2 $=10$ Marks
11. Why do we adopt numerical methods to solve algebraic and transcendental equations? CO1
12. Give an example for transcendental equation. CO1
13. State the fundamental theorem from the theory of equations. $\mathbf{C O 1}$
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:

18. Find the positive root of $x-\cos x=0$ by bisection method.
19. Find the real root of the equation $\cos x=3 x-1$ correct to 4 decimal places by iteration method.
20. Find a positive root of $x e^{x}=2$ by the method of False position.
21. Solve the system of equations by Gauss-Elimination method

$$
\begin{gathered}
x+2 y+z=3 \\
2 x+3 y+3 z=10 \\
3 x-y+2 z=13
\end{gathered}
$$

22. Solve by Gauss-Elimination method

$$
\begin{aligned}
& 2 x+3 y-z=5 \\
& 4 x+4 y-3 z=3 \\
& 2 x-3 y+2 z=2
\end{aligned}
$$

## SECTION - D

Answer any ONE Question:

$$
\begin{aligned}
& 3 x+4 y+5 z=18 \\
& 2 x-y+8 z=13 \\
& 5 x-2 y+7 z=20
\end{aligned}
$$

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| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Course Code: | 06CT61 | Programme: | B.Sc. Physics | CIA: | I |
|  | Date: | 24.01.2023 | Part: | III | Semester: | VI |
|  | Duration: | 2 Hours | Academic Year: | 2022-23 | Max. Marks: | 50 |
|  | Study Component: |  | Core |  |  |  |
|  | Course Title: | NUCLEAR PHYSICS |  |  |  |  |

## SECTION - A (Remembering)

Answer ALL the Questions:
( 10 X 1 = 10 Marks)
1 The atomic nucleus was discovered in 1911 by CO1
a) Rutherford
b) Newton
c) Maxwell
d) Bohr

2 The empirical formula for the nuclear radius $(\mathrm{R})$ is
a) $r_{0} A^{2 / 3}$
b) $\mathrm{r}_{0} \mathrm{~A}^{1 / 3}$
c) $r_{0} \mathrm{~A}^{5 / 3}$
d) $\mathrm{r}_{0} \mathrm{~A}^{9 / 3}$

3 One barn is
CO1
a) $10^{-28} \mathrm{~m}^{2}$
b) $10^{-30} \mathrm{~m}^{2}$
c) $10^{-24} \mathrm{~m}^{2}$
d) $10^{-20} \mathrm{~m}^{2}$

4 The range of nuclear force ( $R$ ) is
CO1
a) $1.8 \times 10^{-15} \mathrm{~m}$
b) $1.5 \times 10^{-15} \mathrm{~m}$
c) $1.4 \times 10^{-15} \mathrm{~m}$
d) $1.2 \times 10^{-15} \mathrm{~m}$

5 The shell model is able to account for several nuclear phenomena in addition to
CO1
a) magic numbers
b) packing fraction
c) binding energy
d) magnetic moment

6 Which chamber has led to the discovery of many elementary particles like positron, meson, CO1 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
a) Henri Becquerel
b) Rutherford
c) Maxwell
d) Bohr

9 An $\alpha$-particle is a helium nucleus consisting of two protons and two
a) electrons
b) protons
c) neutrons
d) deuteron

10 The charge carried by each $\alpha$ - particle is
CO2
a) $3.19 \times 10^{-19} \mathrm{C}$
b) $3.19 \times 10^{-11} \mathrm{C}$
c) $3.19 \times 10^{-9} \mathrm{C}$
d) $3.19 \times 10^{-29} \mathrm{C}$

## SECTION - B (Remembering)

Answer any FIVE Questions:
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. $\mathbf{C O 2}$
17 State Geiger's law.
CO2

## SECTION - C (Understanding)

Answer any THREE Questions:
(3X6=18 Marks)
18 Explain the Yukawa's Meson theory of nuclear forces.
19 Explain the liquid drop model of the nucleus with suitable theory.

# 20 Alpha particles of energy 5 MeV pass through an ionization chamber at the rate of 10 per 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 $\mathrm{e}=1.6 \times 10^{-19} \mathrm{C}$ ) <br> 21 Discuss about the determination of the charge of Alpha particles. <br> 22 Write brief note on Alpha particle spectra. 

## 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.

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|  | 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 |  |  |  |

## Course Title: QUANTUM MECHANICS \& RELATIVITY

## SECTION - A

(10 X 1 = 10 Marks

## Answer ALL the questions:

$\qquad$ CO1

1. Lenard's Experiment clearly shows that photo particles are
a)Electrons
b) neutrons
c) Protons
d) none of these
2. The energy of a photon is directly related to

CO1
a) frequency
b) intensity
c) wave number
d) time period
3. Critical frequency is one $\qquad$ which no photoelectrons are emitted.

CO1
a) above
b) below
c) at
d) all the above
4. For an electron, the minimum energy needed to escape from a particular metal surface is called of the metal.
a) work function
b) ionization energy
c) quantum energy
d) potential energy
5. Wave number of a particle is given by $\mathrm{k}=$ $\qquad$ CO1
a) $2 \pi / \lambda$
b) $2 \pi \lambda$
c) $\lambda / 2 \pi$
d) $4 \pi / \lambda$
6. Unit for wave number is

CO1
a) radian $/ \mathrm{sec}$
b) radian / metre
c) radians
d) metre
7. The velocity and hence the energy of the emitted photoelectrons is independent of the $\qquad$ of light CO1 and depends only on the frequency of the incident light and the nature of the metal.
a) intensity
b) wavelength
c) wave number
d) None of these
8. The de-Broglie wavelength of a particle of mass ' $m$ ' and velocity ' $v$ ' is given by
a) $\lambda=\frac{h}{3 m v}$
b) $\lambda=\frac{h}{\sqrt{3} m v}$
c) $\lambda=\frac{h}{m v}$
d) $\lambda=\frac{4 h}{m v}$
9. Heisenberg Uncertainty principle is given by

CO2
a) $\Delta x \Delta p=h / 2 \pi$
b) $\Delta x \Delta p=h / 4 \pi$
c) $\Delta \mathrm{x} \Delta \mathrm{p} \geq \mathrm{h} / 4 \pi$
d) $\Delta x \Delta p \geq h / 2 \pi$
10. Davisson and Germer experiment confirms
a) The value of Planck's constant
b) The wave nature of electrons
c) The nuclear size
d) Ratio of $\frac{e}{m} \quad$ value

## SECTION - B

## Answer any FIVE Questions:

11. Define photoelectric effect. CO1
12. Define threshold frequency. CO1
13. State quantum theory. $\mathbf{C O 1}$
14. Define work function of a metal. $\mathbf{C O 1}$
15. What are photoelectric cells? CO1
16. Define group velocity. $\mathbf{C O 2}$
17. State Heisenberg's uncertainty principle. $\mathbf{C O 2}$
18. Calculate the work function of Sodium in electron-volts, given that the threshold wavelength is $6000 \times 10^{-10} \mathrm{~m}$, and $\mathrm{h}=6.625 \times 10^{-34} \mathrm{Js}$
CO1
19. State the laws of photoelectric emission. $\mathbf{C O 1}$
20. Derive Einstein's photoelectric equation. CO1
21. Derive the expression for Broglie wavelength. $\mathbf{C O 2}$
22. Show that the Broglie wavelength associated with an electron of energy VeV is approximately $\mathbf{C O 2}$ (1.22/ $\sqrt{V}$ ) nm.

## SECTION - D

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

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|  | Course Code: | 06SB61 | Programme: | B.Sc. Physics | CIA: | I |
|  | Date: | 18.01.2023 | Part: | IV | Semester: | VI |
| 运边 | Duration: | 1 Hour | Academic Year: | 2022-23 | Max. Marks: | 25 |
| Now | Study Component: |  | Skill Based |  |  |  |
|  | Course Title: | NANO TECHNOLOGY |  |  |  |  |

## SECTION - A

Answer ALL the Questions:
( 5 X $1=5$ Marks)
1 Who first defined the term nanotechnology?
a)Eric Drexler
r b) Richard raphem
c) Norio Taniguchi
d) Heinrich Rohrer

2 The energy separation between valence band and conduction band is called
a)Energy gap
b) Band gap
c) Fermi level
d) both $a$ and $b$

3 The thermal conductivity of nanomaterial is $\qquad$ times greater than metal.
a) 10
b) 100
c) 50
d) 6

4 The organic nanomaterial fullerene is a class of allotropes of $\qquad$
a) rapheme
b) carbon
c) lithium
d) argon

5 SEM stands for
a)Scanning Electrode Microscope
b)Scanning Electrical Microscope
c)Scanning Electron Microscope
d)Scanning Emission Microscope

## SECTION - B

Answer any TWO Questions:
( $\mathbf{2}$ X $2=4$ Marks )
6 What is Nanotechnology?
7 What is Nanomaterial? CO 1

8 Define Nanocomposite.
9 Write down the physical and chemical properties of nanomaterial.

## SECTION - C

Answer any ONE Question:
(1 X 6= 6 Marks)
10 Give a brief account on the types of nanomaterials.
11 List out of some applications of nanomaterials to biology and medicine.
CO 5

## SECTION - D

Answer any ONE Question:
( $\mathbf{1}$ X 10= 10 Marks)
12 Explain about the surface, electrical, optical, thermal and mechanical properties of CO 1 nanomaterials.

13 Discuss briefly about the applications of nanomaterials.

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|  | Course Code: | 06SB62 | Programme: | B.Sc. Physics | CIA: | I |
|  | Date: | 19.01.2023 | Part: | IV | Semester: | VI |
|  | Duration: | 1 Hour | Academic Year: | 2022-23 | Max. Marks: | 50 |
|  | Study Component: |  | Skill Based |  |  |  |
|  | Course Title: | PHYSICS FOR COMPETITIVE EXAMINATIONS |  |  |  |  |

Answer ALL the Questions:
( 50 X 1 = 50 Marks)

1. $\mathrm{M}^{1} \mathrm{~L}^{1} \mathrm{~T}^{-1}$ is the dimension of CO1
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. $\mathrm{Nm}^{-2} \mathrm{~kg}^{-2}$
B. $\mathrm{Nm}^{-2} \mathrm{~s}^{-2}$
C. $\mathrm{Nms}^{-2}$
D. $\mathrm{Nm}^{2} \mathrm{~kg}^{-2}$
4. The SI unit of universal gas constant ( R ) is
A. $\mathrm{JK}^{-1} \mathrm{~mol}^{-1}$
B. $\mathrm{NK}^{-1} \mathrm{~mol}^{-1}$
C. WattK ${ }^{-1} \mathrm{~mol}^{-1}$
D. $\mathrm{ergK}^{-1} \mathrm{~mol}^{-1}$
5. The dimensional formula for Planck's constant (h) is
A. $\left[\mathrm{ML}^{2} \mathrm{~T}^{-3}\right]$ B. $\left[\mathrm{ML}^{2} \mathrm{~T}^{-2}\right]$ C. $\left[\mathrm{ML}^{2} \mathrm{~T}^{-1}\right]$ D. $\left[\mathrm{ML}^{-2} \mathrm{~T}^{-2}\right]$
6. If $L$ and $R$ denote inductance and resistance respectively, then the dimension of $L / R$ is
A. $M^{0} L^{0} T^{0} B$
B. $M^{0} L^{0} T^{1} C$
C. $\mathrm{M}^{2} \mathrm{~L}^{0} \mathrm{~T}^{2} \mathrm{D}$
7. Electron volt $(\mathrm{eV})$ 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
11. 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 motion
A. the angular speed remains constant B. the angular momentum remains constant $C$. the linear speed remains constant $D$. the linear momentum remains constant
13. 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 $1^{\text {st }}$ law of motion is valid
B. Newton's $2^{\text {nd }}$ law of motion is valid
C. Newton's $3^{\text {rd }}$ law is valid
D. Newton's $1^{\text {st }}$ law of motion is invalid
16. In the absence of external force the velocity of center of mass
A. 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
18. The necessary and sufficient condition for S.H.M. is
A. constant period B. constant acceleration C. proportionality between restoring force and displacement $\quad \mathrm{D}$. 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. 3 T
D. T
22. The differential equation representing the free vibrations of a body is $\frac{d^{2} y}{d t^{2}}+\omega^{2} y=0$. 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 4 R is
A. 4 T
B. $\mathrm{T} / 4$
C. $8 \mathrm{~T} \quad \mathrm{D} . \mathrm{T} / 8$
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 on
A. 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. $1092{ }^{\circ} \mathrm{K}$
B. $273{ }^{\circ} \mathrm{K}$
C. $-273{ }^{\circ} \mathrm{K}$
D. $1492{ }^{\circ} \mathrm{K}$
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 $1 \mathrm{eV}=1.6 \times 10^{-19} \mathrm{~J}$, the temperature required for nuclear fusion to occur with deuterium is about
A. $5 \times 10^{11} \mathrm{~K}$
B. $5 \times 10^{10} \mathrm{~K}$
C. $5 \times 10^{9} \mathrm{~K}$
D. $5 \times 10^{8} \mathrm{~K}$
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
B. conversion of heat into other forms of energy
quantity of heat
D. transfer of heat
C. measurement of
36. An ideal gas heat engine operates in a Carnot cycle between $227^{\circ} \mathrm{C}$ and $127^{\circ} \mathrm{C}$. It absorbs $6 \times 10^{4}$ cals at the higher temperature. The amount of heat converted into work is equal to
A. $4.8 \times 10^{4}$ cals
B. $3.5 \times 10^{4}$ cals
C. $1.6 \times 10^{4} \mathrm{cals}$
D. $1.2 \times 10^{4} \mathrm{cals}$
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 $\mathrm{P}-\mathrm{V}$ diagram represents
A. work done on or by the system B. work done in a cyclic process C. the thermodynamic process D. the condition of the system
39. The triple point of a substance is the temperature at which
A. 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 $1 / 4^{\text {th }}$ 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. $1 / 4 \mathrm{~atm}$
C. 16 atm
D. $1 / 16 \mathrm{~atm}$
41.1 kg of ice at $0^{\circ} \mathrm{C}$ is melted and converted to water at $0^{\circ} \mathrm{C}$. The change of entropy is
A. $29.3 \mathrm{cal} /{ }^{\circ} \mathrm{K}$
B. $293 \mathrm{cal} /{ }^{\circ} \mathrm{K}$
C. $2.93 \mathrm{cal} /{ }^{\circ} \mathrm{K}$
D. $2930 \mathrm{cal} /{ }^{\circ} \mathrm{K}$
41. 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
42. A body which absorbs all the radiations incident over it is called as
A. good absorber B. good emitter C. good transmitter D. perfectly black body
43. We receive heat energy from the Sun by
A. radiation B. conduction C. convection D. diffraction
44. The radiation emitted by a perfectly black body is proportional to
A. temperature on the ideal gas scale B. fourth root of temperature on ideal gas scale
C. fourth power of temperature on ideal gas scale D. source of temperature on ideal gas scale
45. According to Newton's law of cooling, the rate of cooling is
A. 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
46. 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
47. Light waves are
A. transverse B. longitudinal C. neither longitudinal nor transverse D. shear waves
48. In the propagation of electromagnetic waves the angle between the direction of propagation and plane of polarization is
A. $0^{\circ}$
B. $45^{\circ}$
C. $90^{\circ}$
D. $180^{\circ}$
49. 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

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|  | Course Code: | 06SB63 | Programme: | B.Sc. Physics | CIA: | I |
|  | Date: | 27.01.2023 | Part: | IV | Semester: | VI |
| \% ${ }^{\text {c }}$ c | 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. Physiological parameter(s) of our biological system is/are

CO1
a) velocity of blood flow
b) temperature
c) blood pressure
d) all the above
2. $\qquad$ is the measure of the reproducibility of the measurements
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
a) sensitivity
b) accuracy
c) linearity
d) frequency
4. ___ is called cardiac pacemaker. CO 2
a) Sino Atrial node
b) Atrio-Ventricular node
c) The bundle of HIS
d) Purkinje fibres
5. Universally adopted ECG lead colour for Right leg is
a) Red
b) Blue
c) Green
d) Black

## SECTION-B

Answer any TWO questions:
$2 \times 2=4$ Marks
6. Define linearity. CO1
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

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

Answer any ONE questions:
$1 \times 10=10$ Marks
12. Explain Bipolar Limb Leads with neat diagrams. $\mathbf{C O 1}$
13. With diagram explain ECG Recording setup. CO2

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|  | Course Code: | 06SE41 | Programme: | B.Sc. Physics | CIA: | I |
|  | Date: | 19.01.2023 | Part: | IV | Semester: | IV |
| 运边 | Duration: | 1 Hour | Academic Year: | 2022-23 | Max. Marks: | 25 |
| , | Study Component: |  | Skill Enhancement Course |  |  |  |
|  | Course Title: | ASTROPHYSICS |  |  |  |  |

## SECTION - A

Answer ALL the Questions:
( 5 X $1=5$ Marks)
1 The core of the lunar interior has a radius of about
a) 600 km
b) 700 km
c) 6000 km
d) 7000 km

2 Regolith means
CO 1
a)earth soil b)lunar soil c)mars soil d)bible
3 Anyone with a compass knows, the earth has a
a)earth field b)electromagnetic field c)magnetic field d)none

4 As the air near the ground is heated, it
a)contracts
b)expands
c) goes down
d)goes up

5 Most familiar and characteristic features on the moon are its
a)mountains
b)maria c)craters
d)volcanoes
SECTION - B

Answer any TWO Questions:
(2 X $2=4$ Marks)
6 Define Magnetosphere.
7 Define Lunar eclipse. CO 1
8 Define Solar eclipse. CO 1
9 What is Maria? CO 1

## SECTION - C

Answer any ONE Question:
( $1 \times 6=6$ Marks)
10 Sketch the layers in the atmosphere.
11 Write a short note on Moon.

## SECTION - D

Answer any ONE Question:
12 Explain the history of the earth with diagram.
13 Explain solar and lunar eclipses with neat diagram. CO 1

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|  | 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 |  |  |  |
|  | Course Title: | ALLIED PHYSICS - II |  |  |  |  |

## SECTION - A (Remembering)

Answer ALL the Questions:
( 10 X 1 = 10 Marks)
1 Direct evidence for the existence of magnetic moments of atoms and their space quantization $\mathbf{C O 2}$ 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 to $\qquad$ Bohr magnetron
a) One
b) two
c) three
d) four

3 Which of the following are called noble gases?
a) Chromium
b) cadmium
c) zinc
d) krypton

4 Which of the following are not noble gases?
a) Argon b) xenon c) zinc d) krypton

5 The precise nature of the forces acting in the- $\qquad$ CO 3
a) nucleus
b) atom
c) proton
d) electron

6 The theory of general relativity was developed by

$$
\text { CO } 4
$$

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?
a)Length of an object
b) time
c) space
d) velocity of light

8 In the equation $\mathrm{E}=\mathrm{mc}^{2}$, what does ' m ' stand for?
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
a)Lorentz force contraction
b) Lorentz - Galilean contraction
c) Lorentz - Fitzgerald contraction
d) Lorentz - Einstein contraction

10 If 4 kg of a substance is fully converted into energy, how much energy is produced?
CO 4
a) $3.6 \times 10^{17} \mathrm{~J}$
b) $2.6 \times 10^{17} \mathrm{~J}$
c) $3.6 \times 10^{10} \mathrm{~J}$
d) $3.6 \times 10^{-17} \mathrm{~J}$

## SECTION - B (Remembering)

Answer any FIVE Questions:

12 Define Bohr electron magneton CO 2
13 Give the principle of Stern and Gerlach experiment CO 2

14 Define the term unified mass unit

15 State the postulates of the theory of relativity. CO 4
16 What is inertial frame?
CO 4
17 Write down about twin paradox.
CO 4

## SECTION - C (Understanding)

Answer any THREE Questions:

18 Describe the theory and experimental arrangement of stern and gerlach experiment

CO 2

19 Derive Einstein mass energy relation.
CO 4
20 Using Lorentz transformation equation, explain Length Contraction in detail. CO 4
21 Calculate the rest energy of an electron in joules and in electron volts. CO 4
22 How fast rockets have to go relative to an observer for its length to be contracted to $99 \%$ of CO 4 its length at rest?

## SECTION - D (Applying)

Answer any ONE Question:
23 What do you understand by Nuclear fission? Explain the release of energy during nuclear ..... CO 3 fission24 Derive Lorentz transformation equation.CO 4

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|  | 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 |
|  | Study Component: |  | Core Course |  |  |  |
|  | Course Title: | THERMODYNAMICS AND STATISTICAL MECHANICS |  |  |  |  |

## SECTION - A (Remembering)

Answer ALL the Questions:
( 10 X $1=10$ Marks $)$
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 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
a) vacuum pump
b) cool air
c) ice
d) water

4 In superconductivity, the electrical resistance of material becomes
a) Zero
b) Infinite
c) Finite
d) All of the above

5 An isochoric process occurs at constant
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 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 underlying
a) ice formation
b) heat engine
c) vapour compression machine
d) vaporization of water

8 The door of running refrigerator inside a room is left open. Mark the correct statement
a) the room will be cooled slightly
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 unaffected

9 At constant temperature, ( $U$ being the internal energy)
a) $U$ change when $V$ or $P$ changes
b) $U$ does not change when $V$ or $P$ changes
c) $U$ does not change when $T$ changes
d) $U$ is not a function of temperature

10 The value of probability of an event cannot be
a) zero
b) 1
c) $1 / 2$
d) negative

## SECTION - B (Remembering)

Answer any FIVE Questions:
14 Differentiate between open and closed system. ..... CO3
15 State the zeroth law of thermodynamics. ..... CO3
16 What is a reversible process? ..... CO3
17 Define probability of an event. ..... CO4
SECTION - C (Understanding)
Answer any THREE Questions:(3 X 6= 18 Marks)
18 Describe Linde's process for liquefaction of air. ..... CO2
19 Show that for an adiabatic change in a perfect gas $\mathrm{PV}^{\gamma}=$ constant. ..... CO3
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 $27^{\circ} \mathrm{C}$. If the ..... CO3tyre suddenly bursts, find the resulting temperature.
22 Find the efficiency of a Carnot's engine working between $127^{\circ} \mathrm{C}$ and $27^{\circ} \mathrm{C}$. It absorbs $80 \quad \mathbf{C O 3}$ cals of heat. How much heat is rejected?

## SECTION - D (Applying)

Answer any ONE Question:
(1X 12= 12 Marks)
23 Calculate the work done in a Carnot's cycle of operations. Deduce the efficiency of a CO3 Carnot's engine in terms of the temperatures between which it works.
24 Obtain the general form of Maxwell - Boltzmann energy distribution law. CO4

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|  | Course Code: | 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 Component: |  | Core Course |  |  |  |
|  | Course Title: | OPTICS AND SOUND |  |  |  |  |

## SECTION - A (Remembering)

Answer ALL the Questions:
( 10 X 1 = 10 Marks)
1 Diffraction based on the wave theory was explained by CO 2
a) Fresnel
b) Fraunhofer
c) Thomas Young
d) Bragg

2 The separation between screen and aperture in Fraunhofer diffraction is
CO 2
a) Very small
b) very large
c) intermediate
d) zero

3 . Resolving power of R of the grating is CO 2
a) $\mathrm{Nm}^{-1}$
b) Nm
c) Fm
d) Cm

4 The Bragg's law relation $2 \mathrm{~d} \sin \theta=$ $\qquad$ CO 2
a) $m \lambda$
b) $\alpha \lambda$
c) $\omega^{2} \lambda$
d) zero

5 For proper communication, the transmitting antenna, receiving antenna and $E$ of the electromagnetic wave should be $\qquad$ to each other
a) parallel
b) perpendicular
c) both a and b
d) neither a nor b

6 Transverse nature of light is best shown by
CO 3
a) interference b) diffraction c) polarization d) refraction

7 On an ideal polarizing sheet, the intensity of the polarized light transmitted through the sheet is
$\qquad$ 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) $I=I m \cos ^{2} \Theta$
b) $I=I m \sin ^{2} \theta$
c) $I=\operatorname{Im} \sin ^{2} \omega$
d) $I=I m \sin \omega$

9 The phenomenon by which the incident light falling on a surface is sent back into the same
CO 3 medium is known as
a) Polarization
b) reflection
c) refraction
d) absorption

10 A particle moves in a circular path, with a uniform speed. Its motion is
CO 4
a) periodic
b) simple harmonic
c) oscillatory
d) angular simple harmonic

## SECTION - B (Remembering)

Answer any FIVE Questions:
11 What is grating?
12 What is X-ray?
CO 2
13 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. ..... CO 4
SECTION - C (Understanding)
Answer any THREE Questions:
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 ( $\mathrm{n}=1.50$ ) in air as a polarizer. Find the polarizing angle and the angle ..... CO 3of refraction22 Explain in detail about the double refractionCO 3
SECTION - D (Applying)
Answer any ONE 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.CO 4

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|  | 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 |
|  | Study Component: |  | Core Course |  |  |  |
|  | Course Title: | ANALOG ELECTRONICS |  |  |  |  |

## SECTION - A (Remembering)

Answer ALL the Questions:
( $10 \times 1=10$ Marks)
1 In a transistor,
CO2
a) $\mathrm{I}_{\mathrm{C}}=\mathrm{I}_{\mathrm{E}}+\mathrm{I}_{\mathrm{B}}$
b) $I_{B}=I_{C}+I_{E}$
c) $I_{E}=I_{C}-I_{B}$
d) $\mathrm{I}_{\mathrm{E}}=\mathrm{I}_{\mathrm{C}}+\mathrm{I}_{\mathrm{B}}$

2 The value of $\beta$ for a transistor is generally $\qquad$ CO 2
a) 1
b) less than 1
c) Between 20 and 500
d) above 500

3 A JEFT is similar in operation .............valve.
CO2
a) diode
b) pentode
c) triode
d) tetrode

4 Which of the following device has lowest noise-level
CO2
a) triode
b) bipolar Transistor
c) tetrode
d) JEFT

5 The operating point is also called the
$\mathrm{CO3}$
a) cut off point
b) quiescent point
c) saturation point
d) active point

6 The base resistor method is generally used in
CO
a) amplifier circuits
b) switching circuits
c) rectifier circuits
d) regulator circuits

7 Transistor biasing is done to keep. in the circuit .
a) proper direct current
b) proper alternating current
c) the base current is small
d) collector current small

8 The disadvantages of the voltage divider bias is that it has
a) high stability factor
b) low base current
c) manv resistors
d) high innut impedance

9 RC coupling is used for
a) voltage amplification
b) current amplification
c) power amplification
d) voltage stabilization

10 An oscillator converts
a) a.c. power into d.c. power
b) d.c. power into a.c. power
c) mechanical power into a.c. power
d) d.c. to oscillation

## SECTION - B (Remembering)

Answer any FIVE Questions:
11 What is the Q-point?
CO2
12 Write the formula for current gain.
CO2
13 Define the term Pinch off voltage. $\mathbf{C O 2}$
14 Define the stability factor of a transistor. $\mathbf{C O 3}$
15 What is mid-point biasing? CO3
16 What is the use of emitter bypass capacitor in transistor amplifier? CO3
17 Write the expression for Barkhausen criterion. $\mathbf{C O 4}$

## SECTION - C (Understanding)

Answer any THREE Questions:
(3X6=18 Marks)
18 A JFET has a drain current of 5 mA . If $\mathbf{I}_{\text {DSS }}=10 \mathrm{~mA}$ and $\mathbf{V}_{\mathbf{G S}(\text { off })}=-6 \mathrm{~V}$, Find the value of $\mathbf{C O 2}$ (i) $\quad \mathbf{V}_{\mathbf{G S}} \quad$ and $\quad$ (ii) $\mathbf{V}_{\mathbf{P}}$

19 Differentiate between JFET and bipolar transistor.

20 Explain the base resistor method of transistor biasing. $\mathbf{C O 3}$
21 Explain the biasing with collector feedback resistor method. $\mathbf{C O 3}$
22 Draw the circuit of a practical single stage transistor amplifier. Explain the function of $\mathbf{C O 3}$ each component.

## SECTION - D (Applying)

Answer any ONE 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.

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|  | 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 |
| $\sim$ | Study Component: |  | Core Course |  |  |  |
|  | Course Title: | NUMERICAL 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
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?
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 difference of itself and another row
4. To ensure that the following system of equations,

$$
\begin{aligned}
2 x_{1}+7 x_{2}-11 x_{3}= & 6 \\
x_{1}+2 x_{2}+x_{3}= & -5 \\
7 x_{1}+5 x_{2}+2 x_{3}= & 17
\end{aligned}
$$

converges using Gauss-Seidel Method, one can rewrite the above equations as follows:
a) $\left[\begin{array}{ccc}2 & 7 & -11 \\ 1 & 2 & 1 \\ 7 & 5 & 2\end{array}\right]\left[\begin{array}{l}x_{1} \\ x_{2} \\ x_{3}\end{array}\right]=\left[\begin{array}{c}6 \\ -5 \\ 17\end{array}\right]$ b) $\left[\begin{array}{ccc}7 & 5 & 2 \\ 1 & 2 & 1 \\ 2 & 7 & -11\end{array}\right]\left[\begin{array}{l}x_{1} \\ x_{2} \\ x_{3}\end{array}\right]=\left[\begin{array}{c}17 \\ -5 \\ 6\end{array}\right]$ c) $\left[\begin{array}{ccc}7 & 5 & 2 \\ 1 & 2 & 1 \\ 2 & 7 & -11\end{array}\right]\left[\begin{array}{l}x_{1} \\ x_{2} \\ x_{3}\end{array}\right]=\left[\begin{array}{c}6 \\ -5 \\ 17\end{array}\right]$
d) The equations cannot be rewritten in a form to ensure convergence
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?
a) $E=1+\Delta$
b) $\mathrm{E}=1-\Delta$
c) $E=\Delta$
d) $\mathrm{E}=\Delta-1$
7. Gauss forward interpolation formula is applicable if $u$ is $\qquad$ CO 3
a) zero
b) one
c) between 0 and 1
d) greater than 1
8. If interpolation is required near the end of the tabular values we use
a) Newton-Gregory's forward interpolation formula
b) Newton-Gregory's backward interpolation formula
c) Stirling formula
d) Bessel formula
9. $\qquad$ 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
a) $u=\left(x-x_{0}\right) / h$
b) $u=\left(x_{0}-h\right) / x$
c) $u=h x / x_{0}$
d) $u=x_{x} / h$
11. When does the Iterative method succeed in solving all systems of equations?
12. Write down the advantage of Iteration method over direct method in solving systems of equations. CO2
13. Which method, Gauss-Jacobi method or Gauss-Seidel method converges faster, for the solution of a system of algebraic equations $\mathbf{A x}=\mathbf{b}$ ?

CO2
14. Why do we prefer polynomial interpolation?
15. Give the main features of Gregory-Newton's forward interpolation formula. $\mathbf{C O 3}$
16. For performing interpolation of a given data, when do we use the Newton's forward and backward difference formulas?

CO3
17. Write down the Newton-Cote's quadrature formula.

## SECTION - C

Answer any THREE Questions:
3 X $6=18$ Marks
18. Solve the system of equations by Gauss-Seidel method

$$
\begin{array}{r}
x+y+54 z=110 \\
27 x+6 y-z=85 \\
6 x+15 y+2 z=72
\end{array}
$$

19. From the following table of half-yearly premium for policies maturing at different ages, estimate the premium
for polices maturing at age 46 and 63
CO 3

| Age $\quad \mathbf{x}:$ | 45 | 50 | 55 | 60 | 65 |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Premium y : | 114.84 | 96.16 | 83.32 | 74.48 | 68.48 |

20. Find a polynomial of degree two which takes the values

CO3

| $\mathbf{x ~ : ~}$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $\mathbf{y}:$ | 1 | 2 | 4 | 7 | 11 | 16 | 22 | 29 |

21. The following data are taken from steam table

CO 3
$\begin{array}{llllll}\text { Temp }{ }^{\circ} \text { C: } & 140 & 150 & 160 & 170 & 180\end{array}$
$\begin{array}{llllll}\text { Pressure kgf/cm } & & 3.685 & 4.854 & 6.302 & 8.076\end{array}$
Find the pressure at temperature $\mathrm{t}=142^{\circ} \mathrm{C}$ and $\mathrm{t}=175^{\circ} \mathrm{C}$
22. Apply Gauss's forward formula to find $f(x)$ at $x=3.5$ from the table below

| $\mathbf{x}:$ | 2 | 3 | 4 | 5 |
| ---: | :--- | :--- | :--- | :--- |
| $\mathbf{f}(\mathbf{x}):$ | 2.626 | 3.454 | 4.784 | 6.986 |

## SECTION - D

Answer any ONE Question:
$1 \times 12$ = 12 Marks
23. Find the values of $y$ at $x=21$ and $x=28$ from the following data
x : $\quad 20$
23
26
29
$\begin{array}{lllll}\mathrm{y}: & 0.3420 & 0.3907 & 0.4384 & 0.4848\end{array}$
24. Evaluate $\quad \int_{0}^{1} \mathrm{dx} /\left(1+\mathrm{x}^{2}\right)$ using Trapezoidal rule with $\mathrm{h}=0.2$. Hence obtain approximate value of $\pi$.

Can you use other formulae in this case.

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|  | 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 |
|  | Study Component: | Core |  |  |  |  |
|  | Course Title: | NUCLEAR PHYSICS |  |  |  |  |

## SECTION - A (Remembering)

Answer ALL the Questions:
1 The beta ray spectrum is a continuous spectrum while the others are
a) cylindrical spectra
b) line spectra
c) spherical spectra
d) emission spectra

2 Who developed a theory to explain the continuous $\beta$ - ray spectrum in 1934 ?
a) Newton
b) Rutherford
c) Fermi
d) Bohr

3 The half-life period of a radioactive substance is defined as the time required for ------of the $\mathbf{C O 2}$ radioactive substance to disintegrate
a) one-fourth
b) one - half
c) one - third
d) one-fifth

4 The mean life of a radioactive substance is the reciprocal of the decay constant
a) M
b) N
c) T
d) $\lambda$

5 The first transmutation of nitrogen in to oxygen was achieved and established by
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
CO 3
a) $\mathrm{Q}>0$
b) $\mathrm{Q}<0$
c) $\mathrm{Q}=0$
d) Kinetic energy $=0$

8 Brain and thyroid tumors are detected using
CO
a) $I^{131}$
b) $\mathrm{P}^{32}$
c) $\mathrm{Co}^{60}$
d) $\mathrm{S}^{35}$

9 The half-life of neutron is
a) 13 hours
b) 13 minutes
c) 13 seconds
d) 13 days

10 In which of the following process are Neutrons emitted?
a) inverse beta decay
b) nuclear fission
c) spontaneous Fission
d) nuclear fusion

## SECTION - B (Remembering)

Answer any FIVE Questions:
11 Write a short note on Beta ray spectra.
CO2
12 State the law of radioactive disintegration constant. $\mathbf{C O 2}$
13 Define the term mean-life period.
CO2
14 Define threshold energy for a nuclear reaction. $\mathbf{C O 3}$
15 Differentiate between slow neutrons and fast neutrons. $\mathbf{C O 3}$
16 Mention the two broad methods of preparation of radioelements. $\mathbf{C O 3}$
17 What do you understand by the term "nuclear fission"? CO4
SECTION - C (Understanding)
Answer any THREE Questions:
(3 X $6=18$ Marks)
18 With a neat diagram, explain the magnetic spectrograph in beta ray spectrum.
CO2
19 Give an account of the discovery of artificial transmutation by Rutherford and the Bohr's $\mathbf{C O 3}$ theory of nuclear disintegration.
20 Elucidate various applications of radioisotopes.
CO3
21 Write a concise account of the production and detection of neutrons. $\mathbf{C O 3}$
22 The Q value of the $\mathrm{Na}^{23}(\mathrm{n}, \alpha) \mathrm{F}^{20}$ reaction is -5.4 MeV . Determine the threshold energy of $\mathbf{C O}$ the neutrons for this reaction.

## SECTION - D (Applying)

Answer any ONE Question:
(1X 12= 12 Marks)
23 Elucidate the discovery of neutrons and enunciate the basic properties of neutrons. $\mathbf{C O 3}$
24 Describe the construction and working of a nuclear reactor along with its uses.

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|  | Course Code: | 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 |
| mosinital | Study Component: |  | Elective |  |  |  |
|  | Course Title: | QUANTUM MECHANICS \& RELATIVITY |  |  |  |  |

SECTION - A

## Answer ALL the questions:

( 10 X 1 = 10 Marks)

1. Heisenberg Uncertainty principle is given by
a) $\Delta x \Delta p=h / 2 \pi$
b) $\Delta x \Delta p=h / 4 \pi$
c) $\Delta x \Delta p \geq h / 4 \pi$
d) $\Delta x \Delta p \geq h / 2 \pi$
2. Electrons are emitted from a metal surface when light falling on it has a minimum
a) Energy
b) Wavelength
c) Velocity
d) Charge
3. The relation between phase velocity and group velocity for a non-relativistic free particle
a) $v_{p}=\frac{v_{g}}{2}$
b) $v_{p}=v_{g}$
c) $v_{p} v_{g}=0$
d) $v_{p}=\frac{v_{g}}{3}$
4. The uncertainty relation holds for
a) Microscopic particles only
b) Macroscopic particles only
c) Microscopic and macroscopic particles both
d) Neither microscopic nor macroscopic particles
5. The expression for the lowest energy state for the electron of the hydrogen atom.
a) $E_{1}=-\frac{m e^{4}}{8 \varepsilon_{0}^{2} h^{2}}$
b) $E_{1}=-\frac{m e^{2}}{8 \varepsilon_{0}^{3} h^{2}}$
c) $E_{1}=-\frac{m e}{8 h \varepsilon_{0}^{2}}$
d) $E_{1}=\frac{m e^{4}}{8 \varepsilon_{0}^{2} h^{2}}$
6. A normalized wave function obeys the equation

CO 3
a) $\int_{-\infty}^{\infty}|\psi|^{2} d V=0$
b) $\int_{-\infty}^{\infty}|\psi|^{2} d V=1$
c) $\int_{-\infty}^{\infty} \psi d V=0$
d) $\int_{-\infty}^{\infty} \psi d V=1$
7. The square of the absolute magnitude of wave function $|\psi|^{2}$ is always a $\qquad$ quantity.
a) positive real
b) negative real
c) zero
d) unity
8. According to quantum mechanics, the energy levels of a particle executing one dimensional S.H.M are
a) Continuous
b) Discrete but equispaced
c) Discrete but non equispaced
d) Nothing can be said
9. The electron orbit in a ground state hydrogen atom is in circumference equal to
a) One de-Broglie wavelength
b) One de-Broglie wavelength
c) 10 de-Broglie wavelength
d) 100 de -Broglie wavelength
10. The wave functions associated with a material particle is $\qquad$ .

CO 4
a) Only finite
b) Only continuous
c) Only single valued
d) Finite continuous and single valued

## SECTION - B

Answer any FIVE Questions:
(5 X $2=10$ Marks)
11. State the principle behind the double slit experiment.
12. State Heisenberg's uncertainty principle.

CO2
13. Give the expression for group velocity and wave number. $\mathbf{C O 2}$
14. What do you mean by degeneracy? $\mathbf{C O 3}$
15. Define orthogonal wave function. $\mathbf{C O 3}$
16. How do you calculate Reflectance and Transmittance? $\mathbf{C O 3}$
17. Write the postulate of quantum mechanics relating the state of a system. CO4
Answer any THREE Questions:
18. Prove the nonexistence of electron in the nucleus on the basis of uncertainty principle. ..... CO2
19. Calculate the permitted energy level of an electron, in a box $1 \mathrm{~A}^{0}$ wide. ..... CO3
20. Calculate the expectation value $\left\langle\mathrm{p}_{\mathrm{x}}\right\rangle$ of the momentum of a particle trapped in a one-dimensional box. ..... CO 3
21. Write notes on momentum operator. ..... CO3
22. List the properties of wave function. (or) Mention the physical significance of wave function. ..... CO3
SECTION - D
Answer any ONE Question:
23. What is a potential step? Find the amplitude of reflected and transmitted beam in terms of incident wave. ..... CO3
24. Determine the energy level of a particle in three dimensional square well. ..... CO4

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|  | Course Code: | 06SB61 | Programme: | B.Sc. Physics | CIA: | II |
|  | Date: | 02.03.2023 | Part: | IV | Semester: | VI |
|  | Duration: | 1 Hour | Academic Year: | 2022-23 | Max. Marks: | 25 |
| ABMOH13.7 | Study Component: |  | Skill Based |  |  |  |
|  | Course Title: | NANO TECHNOLOGY |  |  |  |  |

SECTION - A
Answer ALL the Questions:
( 5 X $1=5$ Marks)
1 Solids are classified into crystalline solids and $\qquad$ based on the arrangement of atoms CO 2 and molecules.
a)conductors
b) insulators
c) semiconductors
d) amorphous solids

2 The coordination number of a NaCl crystal is
CO 2
a) 4
b) 6
c) 12
d) 8

3 An example for Hexagonal close packed structure is
a)Quartz
b)Lead
c) Gold
d) silver

4 Sol-gel method is $\qquad$ approach.
a) Bottom up
b) Up bottom
c) Top down
d) Down top

5 The process of modifying a metal's properties is called $\qquad$
a) Electrolysis
b) Electro deposition
c) Electro less plating
d) Electroplating

## SECTION - B

Answer any TWO Questions:
(2 X $2=4$ Marks )
6 What is a crystal? CO 2
7 List out the seven crystal system CO 2
8 Define Bravais lattice. CO 2
9 Define unit cell. CO 2

## SECTION - C

Answer any ONE Question:
( $1 \times 6=6$ Marks)
10 Sketch out the seven crystal system and fourteen Bravais lattice.
11 Explain about the various crystal bonding.

## SECTION - D

Answer any ONE Question:
12 Discuss briefly about some important crystal structures.
13 Write down the role of Bottom-up and Top - down approach in nanotechnology

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| 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: | $\mathbf{5 0}$ |
| Study Component: | Skill Based |  |  |  |  |
| Course Title: | PHYSICS FOR COMPETITIVE EXAMINATIONS |  |  |  |  |

Answer ALL the Questions:
( $50 \times 1=50$ Marks)

1. The law that governs the force between electric charges is called

CO 3
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 $\mathrm{F}_{\mathrm{g}} / \mathrm{F}_{\mathrm{e}}$ 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. $m g / e \mathrm{C} . e / m g$
D. $e^{2} g / m^{2}$
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 $\theta$ from the initial position is
A. PE $\cos \theta$
B. $\mathrm{PE} \sin \theta$
C. PE $\tan \theta$
D. - PE $\cos \theta$
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. $r^{1}, r^{-1}$ 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. $1.87 \times 10^{7} \mathrm{~m} / \mathrm{s}$ B
B. $18.7 \times 10^{7} \mathrm{~m} / \mathrm{s}$
C. $0.187 \times 10^{7} \mathrm{~m} / \mathrm{s}$ D. $187 \times 10^{7} \mathrm{~m} / \mathrm{s}$
11. Which one of the following relations is correct?
A. $V=q / C$
B. $\mathrm{C}=\mathrm{Vq}$
C. $V=q C \quad$ 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 $4 \mu \mathrm{~F}$ are joined in parallel. The resultant capacitance of combination is
A. $8 \mu \mathrm{~F}$
B. $4 \mu \mathrm{~F}$
C. $2 \mu \mathrm{~F}$
D. $1 \mu \mathrm{~F}$
15. Three condensers of capacitances 10,20 and $30 \mu \mathrm{~F}$ are first connected in series and then connected in parallel. The ratio of the resultant capacitances in the two cases is
A. 1:11
B. 11:1
C. 1:6
D. 6:1
16. The capacity of a parallel plate capacitor is $4 \mu \mathrm{~F}$. The distance between the plates is doubled. The new capacity is
A. $8 \mu \mathrm{~F}$
B. $4 \mu \mathrm{~F}$
C. $2 \mu \mathrm{~F}$
D. $1 \mu \mathrm{~F}$
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. $n^{2} R$
B. $\mathrm{nR} \quad \mathrm{C} . \mathrm{R} / \mathrm{n}$
D. $R / n^{2}$
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 with
A. conservation of charge
B. conservation of energy
C. conservation of momentum
D. 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 direction
A. 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 it
$\begin{array}{lll}\text { A. is doubled } & \text { B. reduces to one-fourth of its initial value } C \text {. remains unchanged }\end{array}$
D. reduces to half of its initial value
26. Lenz's law is a consequence of the law of conservation of
A. mass B. energy C. momentum D. charge
27. The velocity of certain ions that pass undeflected through crossed $E$ and $B$ fields for which $\mathrm{E}=7.7 \mathrm{kV} / \mathrm{m}$ and $\mathrm{B}=0.14 \mathrm{~T}$
A. $22 \mathrm{~km} / \mathrm{s}$ B. $33 \mathrm{~km} / \mathrm{s}$ C. $44 \mathrm{~km} / \mathrm{s}$ D. $55 \mathrm{~km} / \mathrm{s}$
28. A coil of 20 turns has an area of $800 \mathrm{~mm}^{2}$ 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. $2.4 \times 10^{-1} \mathrm{~N}-\mathrm{m}$ B. $2.4 \times 10^{-2} \mathrm{~N}-\mathrm{m} \mathrm{C} .2.4 \times 10^{-3} \mathrm{~N}-\mathrm{m}$
D. $2.4 \times 10^{-4} \mathrm{~N}-\mathrm{m}$
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 $7 \mathrm{~m} / \mathrm{s}$ perpendicular to a magnetic field of intensity $0.9 \mathrm{wb} / \mathrm{m}^{2}$. 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 motor
A. 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
37. 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 be
A. less than the number of turns in the primary B. greater than the number of turns in the primary
C. equal to the number of turns in the primary
D. 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 $\mathrm{E}_{\mathrm{rms}}$, be the R.M.S value of e.m.f, then its peak-to-peak value is given by
A. $\mathrm{E}_{\mathrm{rms}} / \sqrt{ } 2$
B. $\sqrt{ } 2 \mathrm{E}_{\mathrm{rms}}$ C. $2 \sqrt{ } 2 \mathrm{E}_{\mathrm{rms}}$
D. $\mathrm{E}_{\mathrm{rmm}} / 2$
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. $\omega \mathrm{L}$
B. $1 / \omega \mathrm{L}$
C. $\omega^{2} L^{2}$
D. $\omega \mathrm{LR}$
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. $\frac{\sqrt{L C}}{2 \pi}$
B. $\frac{1}{2 \pi \sqrt{L C}}$
C. $\frac{1}{2 \pi} \sqrt{\frac{L}{C}}$
D. $\frac{1}{2 \pi} \sqrt{\frac{C}{L}}$
46. In an LCR A.C. Circuit, the impedance is equal to
A. $\sqrt{R^{2}+\left(X_{L}^{2}-X_{C}\right)^{2}}$
B. $\sqrt{R^{2}+\left(X_{L}-X_{C}\right)^{2}}$
C. $R+\left(X_{L}+X_{C}\right)$
D. $R+\left(X_{L}-X_{C}\right)$
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 $\mathrm{R}=\sqrt{3} \Omega, \mathrm{X}_{\mathrm{L}}=10 \Omega, \mathrm{X}_{\mathrm{C}}=11 \Omega$, 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. $1 \Omega$

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|  | Course Code: | 06SB63 | Programme: | B.Sc. Physics | CIA: | II |
|  | Date: | 04.03.2023 | Part: | IV | Semester: | VI |
|  | 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
a) EEG
b) ECG
c) PET
d) MRI
2. The outer layer of the brain is called $\qquad$
a) cerebrum
b) skull
c) cerebral cortex
d) cerebellum
3. On the surface of the brain, the voltage is about $\qquad$ mV .

CO 3
a) 5
b) 10
c) 15
d) 100
4. $\qquad$ is a symptom for brain damage.

CO 3
a) Tumor
b) Brain death
c) Epilepsy
d) none of the above
5. Servo Controlled Ventilators work in $\qquad$ mode.

CO4
a) Assisted
b) Assisted-control
c) Controlled
d) Pressure control

## SECTION-B

Answer any TWO questions:
$2 \times 2=4$ Marks
CO2
6. What is the duty of Sinoatrial (SA) node?

CO3
7. What is called Epilepsy?

CO3
8. What do you mean by REM sleep? CO4

## SECTION-C

Answer any ONE questions:
$1 \times 6=6$ 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:
$1 \times 10=10$ Marks
12. With diagram explain about placement of electrodes.

CO3
13. Discuss about various electro-surgery techniques using diathermy unit. CO4

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|  | 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 |
|  | Study Component: |  | Skill Enhancement Course |  |  |  |
|  | Course Title: | ASTROPHYSICS |  |  |  |  |

## SECTION - A

Answer ALL the Questions:
( 5 X $1=5$ Marks)
1 The dark region of the sunspot is
CO 2
a)chromosphere b) umbra
c) photosphere
d) transition region

2 The temperature of the corona is
a) 15 MK
b) 2 MK
c) 4 MK
d) 6 MK

3 Central part of the sun is called as
a)corona
b) photosphere
c) core
d) solar flare

4 A white dwarf is $\qquad$ star
a)new born
b) dead
c) living
d) undetermined

5 A star emits its maximum energy at $\qquad$ wavelength
a) short
b)long
c)medium d)ratio

SECTION - B
Answer any TWO Questions:
6 Sun is a star-Justify.
7 What is the Photosphere?
8 Define Protostar.
9 List out the different stages of stellar evolution.

## SECTION - C

Answer any ONE Question:
10 Explain the concept of Solar wind.
11 Derive an expression for luminosity of a star.

## SECTION - D

Answer any ONE Question:

13 Explain about the structure of the sun with neat diagram.

