Dept. of Physics | **I B.Sc., Maths/ Chemistry** | **Time: 2 Hours**
Vivekananda College | **Semester II** | **Date: 10.01.2019**
Tiruvedakam West | **I Internal Test** | **Max. Marks: 50**

ALLIED PHYSICS - II – 06AT02

SECTION – A

Answer All questions **(10 X 1 = 10 Marks)**

1. The relation between the path and phase difference is given by **CO1**
   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 or darkness depends upon **CO1**
   a) n, t and r b) n, t and r c) n, t and m d) n, t and c
3. For Fraunhofer diffraction, the incident wave front is **CO1**
   a) Plane b) Spherical c) Cylindrical d) all the above
4. The points in the consecutive slits separated by the distance is **CO1**
   a) a / b b) a× b c) a + b d) a - b
5. Light is an ----------wave **CO1**
   a) Electromagnetic b) Light c) Sound d) all the above
6. Which of the following gate having only one input and one output? **CO5**
   a) AND b) OR c) NOT d) NOR
7. According to Boolen algebra, A.A is _____ **CO5**
   a) A b) A^2 c) 1 d) 0
8. Which of the following gate is called as inverter? **CO5**
   a) AND b) OR c) NOT d) NOR
9. Who developed the Boolean equation for logic gates? **CO5**
   a) Einstein b) Maxwell c) George Boole d) C.V.Raman
10. AC+ABC = _____ **CO5**
    a) AB b) BC c) AC d) A

SECTION – B

Answer any FIVE questions **5 x 2 = 10 Marks**

11. Give the condition for maxima and minima in interference fringes. **CO1**
12. What is diffraction? **CO1**
13. Define the term plane of polarization **CO1**
14. Draw the symbol and truth table of AND gate. **CO5**
15. Express the number five in the LED format. **CO5**
16. What is Zener diode? **CO5**
17. What is LED? **CO5**

SECTION – C

Answer any THREE questions **3 x 6 = 18 Marks**

18. Explain the phenomenon of interference due to reflected light on thin films **CO1**
19. A parallel beam of sodium light ($\lambda = 589 \times 10^{-9}$ m) is incident on a thin glass plate (n = 1.5) such that the angle of refraction into the plate is 60°. Calculate the smallest thickness of the plate which will make it appear dark by reflection **CO1**
20. Briefly explain the theory of polarisation of light with a neat diagram **CO1**
21. Explain OR gate and AND gate using discrete components. **CO5**
22. State and prove De-Morgan's Theorem. **CO5**

SECTION – D

Answer any ONE questions **1 x 12 = 12 Marks**

23. Give the theory of a plane transmission grating and describe how it is used to determine the wavelength of light **CO1**
24. Describe an experiment to obtain I-V characteristics of a Zener diode. Explain with a circuit diagram use of a zener diode as a voltage regulator. **CO5**

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Dept. of Physics | **I B.Sc., Physics** | **Time: 2 Hours**
Vivekananda College | **Semester II** | **Date:**
Tiruvedakam West | **I Internal Test** | **Max. Marks: 50**

THERMODYNAMICS & STATISTICAL MECHANICS – 06CT21

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. From zeroth law of thermodynamics what one infers is **CO1**
   a) kinetic energy of molecules of a gas is zero. b) ideal gas does not contain molecules
   c) if two systems are separated in thermal equilibrium with a third system then they themselves are in thermal equilibrium with each other. d) absolute zero temperature cannot be attained.
2. 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 ____ **CO1**
   a) impossible, single fixed temperature b) possible, changing temperature
   c) impossible, changing temperature d) possible, single fixed temperature
3. The efficiency of a reversible Carnot's engine working between temperature T_1 and T_2 ($T_1 > T_2$) is **CO1**
   a) $\frac{T_1}{T_2}$ b) $\frac{T_2}{T_1}$ c) $\left(1-\frac{T_2}{T_1}\right)$ d) $\left(\frac{T_1}{T_2}-1\right)$
4. Internal energy of a real gas depends upon **CO1**
   a) only on the temperature of the gas b) only on the volume of the gas
   c) only on the pressure of the gas d) size of the molecule
5. An adiabatic process occurs at constant **CO1**
   a) temperature b) pressure c) heat d) volume
6. The physics of underlying the working of a refrigerator closely resembles the physics underlying **CO1**
   a) ice formation b) heat engine
   c) vapour compression machine d) vaporization of water
7. The work done by a closed system in a reversible process is always ___ that done in an irreversible process. **CO1**
   a) less than or more than b) equal to c) less than d) more than
8. The heat is absorbed by **CO2**
   a) condenser b) evaporator c) compressor d) thermostat
9. Unit of thermal conductivity is **CO2**
   a) J/kg.K b) J/mol.K c) J.ohm/sec.K^2 d) W/m.K
10. Which of the following has least value of thermal conductivity **CO2**
    a) glass b) water c) air d) plastic

SECTION – B

Answer any FIVE questions **5 x 2 = 10 Marks**

11. Write down the equation of state for an ideal gas and explain the terms. **CO1**
12. Differentiate open system and closed system. **CO1**
13. Express first law of thermodynamics in differential form and explain the terms. **CO1**
14. Distinguish between isochoric process and isobaric process. **CO1**
15. Calculate the dimension of coefficient of thermal conductivity. **CO2**
16. Write down the expression for thermal conductivity of a spherical shell. **CO2**
17. What is thermal diffusivity? **CO2**

SECTION – C

Answer any THREE questions **3 x 6 = 18 Marks**

18. Calculate the work done in an isothermal and isochoric process. **CO1**
19. Show that for an adiabatic process PV^{γ} is constant. **CO1**
20. A Carnot engine whose low temperature reservoir is at 7 °C has an efficiency of 50%. It is desired to increase the efficiency to 70%. By how many degrees should the temperature of the high temperature reservoir be increased? **CO1**
21. A quantity of air at 27 °C and atmospheric pressure suddenly compressed to half its original volume. Find the final (i) pressure and (ii) temperature. **CO1**
22. Obtain the expression for thermal conductivity of a cylindrical conductor heated along its axis. **CO2**

SECTION – D

Answer any ONE question **1 x 12 = 12 Marks**

23. Illustrate various parts of an ideal heat engine. Explain the working principle of Carnot's cycle and derive an expression for the efficiency of a Carnot's engine. **CO1**
24. Define coefficient of thermal conductivity. Describe in detail Forbes' method for finding the coefficient of thermal conductivity of a metal bar. Mention some of the limitations of this method. **CO2**

Dept. of Physics | **I Physics** | **Time: 2 Hours**
Vivekananda College | **Semester II** | **Date:11.01.2019**
Tiruvedakam West | **I Internal Test** | **Max. Marks: 50**

Optics & Sound –06CT22

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. The phase difference for constructive interference **CO1**
   a) 0,2π,4 π,... b) π,3 π,5 π,..... c) 0, π/2, π,3 π/2,.. d) zero
2. The phase difference for destructive interference **CO1**
   a) 0,2π,4 π,... b) π,3 π,5 π,..... c) 0, π/2, π,3 π/2,.. d) zero
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 ratio between phase difference and path difference is **CO1**
   a) $\frac{2\pi}{\lambda}$ b) $\frac{\lambda}{2\pi}$ c) $\frac{\pi}{\lambda}$ d) $\frac{3\pi}{\lambda}$
5. The refractive index of water is **CO1**
   a) 1.00 b) 1.45 c) 1.50 d) 1.33
6. The equation $f=f_o\sqrt{1-u^2/c^2}$ states that _____Doppler effect. **CO1**
   a) Transverse b) longitudinal c) linear d) none of these
7. The ratio between speed of light in rarer medium and speed of light in denser medium is known as__ **CO1**
   a) Refractive index b) resolving power c) magnifying power d) interference
8. The phase relationship between two waves does not change with time is called **CO1**
   a) Coherence b) incoherent c) phase difference d) Doppler effect
9. Square of the amplitude of a wave is proportional to its _____ **CO1**
   a) Intensity b) luminosity c) double slit d) single slit
10. _____is a device that can be used to measure change in length with great accuracy by means of interference fringes. **CO1**
    a) Interferometer b) spectrometer c) microscope d) telescope

SECTION – B

Answer any FIVE questions **5 x 2 = 10 Marks**

11. Define constructive interference. CO1
12. Define destructive interference. CO1
13. Define coherence. CO1
14. Define incoherence. CO1
15. Define Interference. CO1
16. What is young double slit experiment? CO1
17. What is Doppler effect? CO1

SECTION – C

Answer any THREE questions **3 x 6 = 18 Marks**

18. Write a note on total internal reflection. CO1
19. Derive the relation for relativistic Doppler effect. CO1
20. Derive the relation for intensity in double slit interference. CO1
21. i) Two coherent sources are 0.18 mm apart and the fringes are observed on a screen 80 cm away. It is found that with a certain monochromatic source of light, the fourth bright fringe is situated at a distance of 10.8 mm from the central fringe. Calculate the wavelength of light. CO1
    ii) In a michelson interferometer 200 fringes cross the field of view when the movable mirror is displaced through 0.0589 mm. Calculate the wavelength of monochromatic light used. CO1
22. i) Green light of wavelength 5100 Ao from a narrow slit is incident on double slit. If the overall separation of 10 fringes on a screen 200 cm away is 2 cm. Find the slit separation. CO1
    ii) In moving one mirror in a Michelson interferometer through a distance of 0.1474 mm, 500 fringes cross the centre of the field of view. What is the wavelength of light? CO1

SECTION – D

Answer any ONE questions **1 x 12 = 12 Marks**

23. Explain the working principle of Michelson's interferometer. Also how to measure the changes in the length by means of interference fringes . CO1
24. Describe the theory of double slit interference. CO1

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Dept. of Physics	**II B.Sc., Physics**	**Time: 2 Hours**
Vivekananda College	**Semester IV**	**Date: 07–01–2019**
Tiruvedakam West	**I Internal Test**	**Max. Marks: 50**

ANALOG ELECTRONICS – 06CT41

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. A crystal diode has
   a) One pn junction b) two pn junctions c) three pn junctions d) four pn junctions
2. The forward voltage drop across a silicon diode is about
   a) 2.5 V b) 3 V c) 10 V d) 0.7 V
3. A crystal diode is used as
   a) An amplifier b) a rectifier c) an oscillator d) a voltage regulator
4. The ripple factor of a half wave rectifier is
   a) 2 b) 1.21 c) 2.5 d) 0.48
5. The maximum efficiency of full wave rectifier is
   a) 40.6% b) 81.2% c) 50% d) 25%
6. Most widely used rectifier is
   a) Half wave rectifier b) full wave rectifier c) centre tap full wave rectifier d) bridge full wave rectifier
7. The base of a transistor is ____ doped
   a) heavily b) lightly c) very lightly d) moderately
8. The value of β for a transistor is generally
   a) 1 b) less than 1 c) between 20 to 500 d) above 500
9. The phase difference between the input and output voltage of a transistor in CE mode
   a) 0^o b) 90^o c) 270^o d) 360^o
10. The most commonly used semiconductor in the manufacturer of a transistor is
    a) Silicon b) germanium c) carbon d) sulphur

SECTION – B

Answer ANY FIVE questions **5X 2 = 10 Marks**

11. What is rectification?
12. Draw the symbols for crystal diode and zener diode.
13. Define ripple factor.
14. Why the filter circuits are used in rectifier circuits?
15. What do you mean voltage stabilisation?
16. Draw the symbols for NPN and PNP transistor.
17. What is an Operating point?

SECTION – C

Answer ANY THREE questions **3 X 6 = 18 Marks**

18. Describe a half wave rectifier using crystal diode.
19. Derive an expression for the efficiency of full wave rectifier.
20. Explain the operation of transistor as an amplifier.
21. A full wave rectifier uses two diodes, the internal resistance of each diodes may be assumed constant at 20 Ω. The transformer r.m.s. secondary voltage from centre tap to each end of secondary is 50 V and load resistance is 980 Ω. Find: i) the mean load current ii) the r.m.s. value of load current.
22. In a common emitter transistor amplifier circuit, V_{CC} = 12 V and R_C = 6kΩ draw the d.c. load line. What will be the Q point if zero signal base current is 20 μA and β = 50?

SECTION – D

Answer ANY ONE questions **1 X 12 = 12 Marks**

23. Explain how zener diode maintains constant output voltage across the load?
24. With neat sketch, explain the working of full wave bridge rectifier.

Dept. of Physics | **II B.Sc., Physics** | **Time: 2 Hours**
Vivekananda College | **Semester IV** | **Date: 11–01–2019**
Tiruvedakam West | **I Internal Test** | **Max. Marks: 50**

MATHEMATICAL PHYSICS – 06CT42

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. Bisection method is also called _____ method
   a) interval halving b) false position c) Newton's d) direct

2. $f(x) = 2x^3 – 9x^2 + 12x + 6$ is a polynomial of degree
   a) two b) three c) one d) four

3. $f(x) = a + be^x + c \sin x + d \log x$ is an example of
   a) algebraic equation b) polynomial equation c) transcendental equation d) differential equation

4. Find the odd one out
   a) Bisection method b) Bolzano's method c) Interval halving method d) Regula-Falsi method

5. Newton Raphson method is also called
   a) Method of tangents b) Method of Chords c) Bisection method d) All the above

6. Newton's method uses
   a) Euler's algorithm b) Taylor expansion c) Interpolation formula d) inverse of a matrix

7. Formula used in Newton Raphson method is
   a) [af(b) – bf(a)] / [f(a) – f(b)] b) [af(b) – bf(a)] / [f(b) – f(a)]
   c) [af(a) – bf(b)] / [f(a) – f(b)] d) [af(a) – bf(b)] / [f(b) – f(a)]

8. Gauss-Elimination method of solving Simultaneous Linear Algebraic Equation is
   a) Direct method b) Indirect method c) Iterative method d) None of these

9. In Gauss-Elimination method the given matrix is converted in to
   a) unit matrix b) upper triangular matrix c) null matrix d) lower triangular matrix

10. 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

SECTION – B

Answer any FIVE questions **5 X 2 = 10 Marks**

11. Why do we adopt numerical methods to solve algebraic and transcendental equations?
12. Give an example for transcendental equation
13. Write the fundamental theorem from the theory of equations
14. What is the disadvantage of Bisection method?
15. Give the salient features of Newton's method
16. What are the two methods used in solving Simultaneous Linear Algebraic Equations?
17. Write 'n' linear equations in 'n' unknowns

SECTION – C

Answer any THREE questions **3 X 6 = 18 Marks**

18. Solve the equation $x^3 + x^2 – 1 = 0$ for the positive root by iteration method
19. Find a positive root of $x e^x = 2$ by the method of False position
20. Find an iterative formula to find $\sqrt{N}$ (where N is a positive number) and hence find $\sqrt{5}$
21. Find the positive root of $f(x) = 2x^3 – 3x – 6 = 0$ by Newton-Raphson method. Correct to five decimal places.
22. Solve the system of equations by Gauss-Elimination method

$$x + 2y + z = 3$$
$$2x + 3y + 3z = 10$$
$$3x – y + 2z = 13$$

SECTION – D

Answer any ONE question **1 X 12 = 12 Marks**

23. Find the positive root of $x^3 – x = 1$ by Bisection method
24. How do you solve simultaneous linear algebraic equation using Gauss Elimination method?

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Dept. of Physics **III B.Sc., Physics** **Time: 2 Hours**
Vivekananda College **Date: 09.01.2019**
Tiruvedakam West **Max. Marks: 50**
I Internal Test **Semester VI**

Nuclear Physics – 06CT61

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. Who invented nuclear fission?
   a) Rutherford b) Hans Bethe c) Marie Curie d) Otto Hahn
2. In which of the following process are Neutrons emitted?
   a) inverse beta decay b) nuclear fission c) spontaneous Fission d) nuclear fusion
3. Fusion reactions are called _____
   a) compound reactions b) thermoduric c) thermo uric d) thermonuclear
4. Complete the following nuclear reaction: $^{16}O_8 + {}^{4}He_2 \rightarrow {}^{19}Ne_{10} + $ _____
   a) ^{1}p b) ^{1}n c) ^{2}H d) ^{3}H
5. When a target nucleus is bombarded by an appropriate beam of particles, it is possible to produce
   a) a less massive nucleus, but not a more massive one
   b) a more massive nucleus, but not a less massive one
   c) a nucleus with smaller atomic number, but not one with a greater atomic number
   d) a nucleus with either greater or smaller atomic number
6. The atomic nucleus was discovered in 1911 by
   a) Rutherford b) Newton c) Maxwell d) Bohr
7. The radius of the atom is about
   a) 10^{-4} m b) 10^{-6} m c) 10^{-8} m d) 10^{-10} m
8. The theoretical explanation for the ----------is based on Einstein's equation
   a) Isobars b) mass defect c) packing fraction d) binding energy
9. The emission of α – particle from the nuclei of radioactive elements is due to the combination of
   a) 2 protons and 2 neutrons b) 2 protons and 3 neutrons
   c) 3 protons and 2 neutrons d) 3 protons and 3 neutrons
10. The range of nuclear force (R) is
    a) 1.8×10^{-15} m b) 1.5×10^{-15} m c) 1.4×10^{-15} m d) 1.2×10^{-15} m

SECTION – B

Answer any FIVE questions **5 x 2 = 10 Marks**

11. Distinguish between nuclear fission and nuclear fusion
12. What is the meaning of the term "critical mass"?
13. What is a chain reaction?
14. Explain the significance of multiplication factor
15. What is binding energy?
16. Define the term packing fraction
17. Write any two characteristics of nuclear forces?

SECTION – C

Answer any THREE questions **3 x 6 = 18 Marks**

18. Explain the working principle of a pressurized water reactor and boiling water reactor.
19. Illustrate nuclear fission with example and elucidate the Bohr and Wheeler's theory of nuclear fission.
20. A reactor is developing energy at the rate of 3000 kW. How many atoms of U^{235} undergo fission per second? How many kilograms of ^{U235} would be used in 1000 hours of operation assuming that on an average energy of 200 MeV is released per fission?
21. Explain the various classification of nuclei
22. Calculate the binding energy of an α – particle and express the result both in MeV and joules

SECTION – D

Answer any ONE questions **1 x 12 = 12 Marks**

23. Describe the construction, working of a nuclear reactor and explain its uses
24. Give briefly the liquid-drop model of the nucleus, bringing out the analogies between a small drop of a liquid and a nucleus. Mention the merits of this model

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Dept. of Physics	**III B.Sc., Physics**	**Time: 2 Hours**
Vivekananda College	**Semester VI**	**Date:10–01–2019**
Tiruvedakam West	**I Internal Test**	**Max. Marks: 50**

MODERN PHYSICS – 06EP61

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. Rate of change of Linear velocity is called _____
   a) Linear acceleration b) Angular acceleration c) Linear momentum d) Angular momentum
2. Angular momentum, L = _____
   a) r x v b) r . p c) r x p d) r . v
3. Torque, N =
   a) r x p b) r x F c) L x p d) L x F
4. Total linear momentum of the system is expressed as, P = _____
   a) **MR** b) $\mathbf{M\dot{R}}$ c) $\mathbf{M\dot{P}}$ d) $\mathbf{m\dot{r}}$
5. Newton's third law is valid for _____ forces
   a) external b) both internal and external c) internal d) neither internal nor external
6. The time derivative of the total angular momentum is equal to the _____
   a) moment of the external forces about the given point
   b) moment of the internal forces about the given point
   c) moment of the both external and internal forces about the given point
   d) moment of the neither internal nor external forces about the given point
7. If constraint relations do not explicitly depend on time, the constraint is _____
   a) Scleronomic b) Rheonomic c) Holonomic d) Bilateral
8. Einstein's mass- energy relation E =
   a) mc b) mc^2 c) m^2c d) m^2c^2
9. The length of the rod moving with a velocity v relative to the observer at rest is contracted by a Factor
   a) $\sqrt{1-v^2}/c^2$ b) $\sqrt{1+v^2}/c^2$ c) $\sqrt{1-c^2}/v^2$ d) $\sqrt{1+c^2}/v^2$
10. The velocity of light in free space is
    a) Variable b) constant c) fixed d) not constant

SECTION – B

Answer any FIVE questions **5 X 2 = 10 Marks**

11. What do you mean by conservation of linear momentum?
12. Mention the quantities relating conservation laws
13. In the absence of external torque, which is conserved?
14. What is called **Σ'**?
15. What do you mean by constrained motion?
16. State the postulates of special theory of relativity.
17. Write the Galilean transformation equations for S' frame.

SECTION – C

Answer any THREE questions **3 X 6 = 18 Marks**

18. Express Angular momentum of the system as the sum of Angular momentum of motion of the Centre of mass and Angular momentum of the motion about the Centre of mass.

19. Show that the Kinetic Energy can be expressed as the sum of the Kinetic Energy of motion of the Centre of Mass and the Kinetic Energy of motion about the Centre of Mass.

20. List out the classification of constraints with example.

21. How fast would a rocket have to go relative to an observer for its length to be contracted to 99% of its length at rest?

22. Explain the relativistic time dilation.

SECTION – D

Answer any ONE question **1 X 12 = 12 Marks**

23. Explain mechanics of a system of particles and also express total linear momentum of the system.

24. Describe the Michelson –Morley experiment and explain the physical significance of negative results.

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Dept. of Physics	**II B.Sc., Physics**	**Time: 1 Hour**
Vivekananda College	**Semester IV**	**Date: 04.01.2019**
Tiruvedakam West	**I Internal Test**	**Max. Marks: 25**

ASTROPHYSICS – 06SB41

SECTION – A

Answer all questions **5 X 1 = 5**

1. The value of μ is nearly ____ when the light travels from air into water

   a) 1.33 b) 3.11 c) 1.31 d) 1.52

2. The value of μ is nearly ____ when the light travels from air to glass

   a) 1.33 b) 3.11 c) 1.31 d) 1.52

3. Snell's law is ____

   a) μ = Sin i / Sin r b) μ = Sin r / Sin I c) μ = Sin θ / Sin r d) μ = Sin π / Sin r

4. Telescopes are used to detect electromagnetic radiation emitted in the ratio wavelength are known as__

   a) Optical telescope b) radio telescope c) Hubble space telescope d) none of these

5. The ratio of the focal length to the aperture of a telescope is called ___

   a) a/f b) f/a c) sin f / sin a d) cos f/ sin a

SECTION – B

Answer any two questions **2 x 2 = 4**

6. Define resolving power.
7. What are f/a ratio?
8. What is interference of light?
9. What is diffraction?

SECTION – C

Answer any one question **1 x 6 = 6**

10. Write a short note on magnifying power and brightness of image.
11. Write down about the optical telescope.

SECTION – D

Answer any one question **1 x 10 = 10**

12. Discuss briefly about light and its properties.
13. Explain about the earth's atmosphere and the electromagnetic radiation.

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Dept. of Physics	**III B.Sc., Physics**	**Time: 1 Hour**
Vivekananda College	**Semester VI**	**Date: 02.01.2019**
Tiruvedakam West	**I Internal Test**	**Max. Marks: 25**

NANOTECHNOLOGY – 06SB61

SECTION – A

Answer all questions **5 X 1 = 5**

1. The structured size of nanomaterial is about

   a) 1 to 100 cm b) 1 to 100nm c) 1 to 100μm d) 1 to100 mm

2. The energy separation between valence band and conduction band is called

   a) E_m b)E_f c)E_g d) E_h

3. Which of the following nanomaterial will exhibit exceptional electrical properties

   a) CWT b) CNT c) CGT d) CTN

4. A crystal structure is a periodic arrangement of _____ in a crystal.

   a) molecules b) atoms c) ions d) none of these

5. The thermal conductivity of nanomaterial is ____ times greater than a metal.

   a) 2 b) 3 c) 5 d)10

SECTION – B

Answer any two questions **2 x 2 = 4**

6. Define nanomaterial.
7. What is nanotechnology?
8. What is metallic bonding?
9. What is band gap?

SECTION – C

Answer any one questions **1 x 6 = 6**

10. Explain about the types of nanomaterials.
11. Write down about the physical & chemical properties of nanomaterials.

SECTION – D

Answer any one questions **1 x 10 = 10**

12. Discuss briefly about properties of nanomaterials.
13. Explain about the covalent bonding & ionic bonding.

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Dept. of Physics | **III B.Sc., Physics** | **Time: 1 Hour**
Vivekananda College | **Semester VI** | **Date: 03.01.2019**
Tiruvedakam West | **I Internal Test** | **Max. Marks: 50**

PHYSICS FOR COMPETITIVE EXAMINATIONS – 06SB62

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1. The dimensions of a couple is
   A. ML^2T^{-2} B. MLT^{-2} C. $ML^{-1}T^{-3}$ D. $ML^{-2}T^{-2}$
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. $Nm^{-2}kg^{-2}$ B. $Nm^{-2}s^{-2}$ C. Nms^{-2} D. Nm^2kg^{-2}
4. The SI unit of universal gas constant (R) is
   A. $JK^{-1}mol^{-1}$ B. $NK^{-1}mol^{-1}$ C. $WattK^{-1}mol^{-1}$ D. $ergK^{-1}mol^{-1}$
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 C and R denote capacity and resistance, the dimension of CR is
   A. $M^0\ L^0\ T^1$ B. $M^1L^0\ T^1$ C. $M^0\ L^0\ T^0$ D. not expressible in terms of M LT
7. Poise is the unit to measure
   A. coefficient of viscosity B. surface tension C. torque D. moment of inertia
8. Electron volt (eV) is the unit of
   A. potential difference B. charge C. Current D. energy
9. Newton's first law of motion gives the concept of
   A. energy B. work C. inertia D. momentum
10. A projectile is fired at an angle θ 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. When two bodies collide elastically, then
    A. kinetic energy of the system alone is conserved B. only momentum is conserved
    C. both energy and momentum are conserved D. neither energy or momentum is conserved
15. 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
16. The necessary and sufficient condition for S.H.M. is
    A. constant period B. constant acceleration
    C. proportionality between restoring force and displacement D. none of the above is correct
17. 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
18. 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
19. 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
20. The differential equation representing the free vibrations of a body is $\frac{d^2y}{dt^2} + \omega^2 y = 0$. The natural frequency of the body is
    A. $\omega/2\pi$ B. $2\pi/\omega$ C. ω D. ω^2
21. The equivalence of two systems in thermal equilibrium is represented by the property
    A. temperature B. heat C. specific heat D. energy
22. Thermodynamics mostly deals with
    A. change of state B. conversion of heat into other forms of energy
    C. measurement of quantity of heat D. transfer of heat
23. An ideal gas heat engine operates in a Carnot cycle between 227 ° C and 127 ° C. It absorbs 6×10^4 cals at the higher temperature. The amount of heat converted into work is equal to
    A. 4.8×10^4 cals B. 3.5×10^4 cals C. 1.6×10^4 cals D. 1.2×10^4 cals
24. The thermodynamic process, in which temperature of the system remains constant, is called
    A. isothermal B. adiabatic C. isomeric D. isobaric
25. The area under the curve on P-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

26. 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 are in equilibrium

27. A perfect gas is compressed to ¼ 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. ¼ atm C. 16 atm D. 1/16 atm

28. 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

29. 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

30. We receive heat energy from the Sun by
A. radiation B. conduction C. convection D. diffraction

31. 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

32. 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

33. 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

34. Light waves are
A. transverse B. longitudinal C. neither longitudinal nor transverse D. shear waves

35. Prof. C. V. Raman was awarded Noble prize for
A. Raman effect B. the discovery of radio C. the discovery of atomic structure D. None of the above

36. 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°

37. 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

38. The energy and momentum of a photon are given by $E=h\nu$ and $P=h/\lambda$ respectively. Velocity of the photon will be
A. EP B. E/P C. P/E D. E/P^2

39. The refractive index of material depends on
A. wavelength of the light B. nature of the material C. temperature D. all of the above

40. The frequency of a light wave is 6.4×10^{14} Hz. Its energy in eV will be ($h=6.6 \times 10^{-34}$ J-sec)
A. 5.28 eV B. 3.96 eV C. 2.64 eV D. 1.32 eV

41. Two coherent sources of light produce interference (destructive) when the phase difference between them is
A. 2π B. $3\pi/2$ C. π D. $\pi/2$

42. When a soap film (or oil film) on water is observed in daylight, it exhibits beautiful colours due to
A. interference B. dispersion C. reflection D. refraction

43. In Young's two slits interference experiment if the distance between the silts is made 3 fold, the fringe width becomes
A. 1/3 fold B. 2 fold C. 1/9 fold D. 9 fold

44. The unit of magnetic induction is
A. Oersted B. Maxwell C. Tesla D. Weber

45. 1 Weber/m^2 is equal to
A. 1 Gauss B. 10 Gauss C. 10^2 Gauss D. 10^4 Gauss

46. Hardness of magnetic material is measured by the value of
A. magnetic induction B. intensity of magnetisation C. density of magnetic material D. coercive force

47. Copper is a ____ substance
A. non-magnetic B. diamagnetic C. paramagnetic D. ferromagnetic

48. Domain formation is the necessary feature of
A. diamagnetism B. paramagnetism C. ferromagnetism D. all the above

49. Curie temperature is that temperature at which the ferromagnetic material
A. has maximum susceptibility B. has zero susceptibility
C. loses its ferromagnetism D. develops reverse polarity

50. A circular coil of radius 4 cm having 50 turns carries a current of 2A. It is placed in uniform magnetic field of 0.1 wb/m^2 . The work done to rotate the coil from equilibrium position by 180° is
A. 0.1 J B. 0.2 J C. 0.4 J D. 0.8 J

Dept. of Physics	**III B.Sc., Physics**	**Time: 1 Hour**
Vivekananda College	**Semester VI**	**Date: 04–01–2019**
Tiruvedakam West	**I Internal Test**	**Max. Marks: 25**

MEDICAL INSTRUMENTATION – 06SB63

SECTION – A

Answer All questions **(5 X 1 = 5 Marks)**

1. Physiological parameters of our biological systems are
   a) temperature b) velocity of blood flow c) blood pressure d) all the above

2. 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

3. _____ is called Cardiac pacemaker
   a) Sinoatrial node b) Atrio-Ventricular node c) The bundle of HIS d) Purkinje fibres

4. The device used to convert one form of signal to electrical signal is
   a) ECG b) EEG c) Transformer d) Transducer

5. The universally adopted ECG lead colour for Right leg is
   a) Brown b) Green c) Red d) Yellow

SECTION – B

Answer Any Two questions **(2 X 2 = 4 Marks)**

6. What do you mean by stability?
7. ECG deals with what?
8. What is the amplitude of QRS complex in ECG wave?
9. Draw Einthoven triangle.

SECTION – C

Answer any ONE question **(1 X 6 = 6 Marks)**

10. With the help of block diagram, write about components of Bio-medical instrument system.
11. Narrate the physiological process of electrical conduction system of heart and hence draw a typical ECG wave.

SECTION – C

Answer any ONE question **(1 X 10 = 10 Marks)**

12. Explain Bipolar Limb Leads with neat diagrams.
13. With diagrams explain ECG recording setup.

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Dept. of Physics | **I B.Sc., Maths/Chemistry** | **Time: 2 Hours**
Vivekananda College | **Semester II** | **Date: 05.03.2019**
Tiruvedakam West | **II Internal Test** | **Max. Marks: 50**
Allied Physics - II – 06AT02

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. The refractive index of O – ray is constant since it obeys ordinary laws of ---------

a) reflection b) refraction c) polarisation d) diffraction **CO1**

2. Quartz is -------uniaxial crystal

a) negative b) positive c) zero b d) all the above **CO1**

3. In an ----------pattern, all the maxima are of same intensity

a) polarization b) refraction c) interference d) diffraction **CO1**

4. The precise nature of the forces acting in the ----------is unknown

a) nucleus b) atom c) proton d) electron **CO2**

5. The formula for mass defect is

a) M-M b) M-N c) M-A d) N-N **CO2**

6. An unaccelerated reference frame in uniform motion of translation relative to one another is called **CO4**

a) Frame of reference b) inertial frame c) Non-inertial frame d) none of the above

7. The theory of general relativity was developed by _____

a) Michael faraday b) Albert Einstein c) Newton d) George Boole **CO4**

8. A system of coordinate axes which defines the position of a particle in two or three dimensional space is called **CO4**

a) Frame of reference b) inertial frame c) non inertial frame d) none of the above

9. Special theory of relativity treats problems involving

a) inertial frame of reference b) non- inertial frame of reference

c) non-accelerated frame of reference d) accelerated frame of reference **CO4**

10. Lorentz transformation equations hold for

a) Non-relativistic velocities only b) relativistic velocities only

c) All velocities: relativistic & non-relativistic d) Photons **CO4**

SECTION – B

Answer any FIVE questions **5 x 2 = 10 Marks**

11. What is uniaxial crystals? **CO2**

12. Define specific rotatory power **CO2**

13. Give two differences between interference and diffraction **CO2**

14. What is unified mass unit? **CO3**

15. State the postulates of special theory of relativity. **CO4**

16. State the Lorentz transformation equations. **CO4**

17. Show that for values of V<<C, Lorentz transformation reduces to the Galilean transformation. **CO4**

SECTION – C

Answer any THREE questions **3 x 6 = 18 Marks**

18. Explain the phenomenon of polarization by double refraction **CO1**

19. State and explain binding energy with illustration **CO3**

20. i) Calculate the specific rotation if the plane of polarization is turned through 26.4˚,

traversing 20 cm length of 20% sugar solution. **CO1**

21. ii) Determine the specific rotation of the given sample of sugar solution if the plane of

a. polarization is turned through 13.2˚. The length of the tube containing 10% sugar

b. solution is 20 cm. **CO1**

22. Derive Einstein mass energy relation $E = mc^2$ **CO4**

i) If 4kg of a substance is fully converted into energy, how much energy is produced?

ii) Calculate the rest energy of an electron in joules and in electron volts. **CO4**

SECTION – D

Answer any ONE questions **1 x 12 = 12 Marks**

23. Describe the construction and use of a half-shade polarimeter to measure the specific

rotatory power of a sugar solution **CO1**

24. Derive the Lorentz space time transformation formulae. **CO4**

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Dept. of Physics	**I B.Sc., Physics**	**Time: 2 Hours**
Vivekananda College	**Semester II**	**Date: 01.03.2019**
Tiruvedakam West	**II Internal Test**	**Max. Marks: 50**

THERMODYNAMICS & STATISTICAL MECHANICS – 06CT21

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. Stefan-Boltzmann law is applicable for heat transfer by **CO2**
   a) conduction b) convection c) radiation d) conduction and radiation combined
2. The unit of Stefan-Boltzmann constant is **CO2**
   a) Watt m^{-2} K^{-4} b) Watt m K^{-1} c) Watt m K^{-4} d) Watt m^2 K^{-4}
3. According to Kirchoff's law, the ratio of emissive power to absorptivity for all bodies is equal to the emissive power of a **CO2**
   a) grey body b) brilliant white polished body c) red hot body d) black body
4. Emissivity of a white polished body in comparison to a black body is **CO2**
   a) higher b) lower c) same d) depends upon the shape of body
5. The value of the wavelength for maximum emissive power is given by **CO2**
   a) Wien's law b) Planck's law c) Stefan's law d) Fourier's law
6. Joule Thomson effect describes gases **CO3**
   a) contraction b) sudden expansion c) expansion d) relaxation
7. When air in Linde's method comes out of jet is **CO3**
   a) expanded b) cooled c) heated d) deatomized
8. Value of Van der Waals constant 'a' increases with increase in **CO3**
   a) pressure b) volume c) intermolecular forces d) temperature
9. The Van der Waals constant 'b' has unit of **CO3**
   a) volume b) pressure c) temperature d) density
10. Critical temperature of a gas is a temperature above which gas does not remain **CO3**
    a) solid b) plasma c) gases d) liquid

SECTION – B

Answer any FIVE questions **5 x 2 = 10 Marks**

11. State and explain Wiedemann-Franz Law. **CO2**
12. Differentiate critical volume and critical pressure. **CO3**
13. Define Solar constant. **CO2**
14. Explain the limitations of Van der Waals Equation. **CO3**
15. Distinguish between Gas and Vapour. **CO3**
16. Obtain Newton's law of cooling from Stefan's law. **CO2**
17. Write the expression for Kirchhoff's law of Radiation. **CO2**

SECTION – C

Answer any THREE questions **3 x 6 = 18 Marks**

18. Show that total radiant heat energy emitted from a surface is proportional to the fourth power of its temperature. **CO2**

19. Describe blackbody spectrum and explain its significance. **CO2**

    If the filament of an incandescent lamp has a surface area of 5.0×10^{-5} m^2 and its relative emittance is 0.85, then calculate the energy radiated per minute **CO2**

20. An aluminum foil of relative emittance 0.1 is placed in between two concentric spheres at temperatures 300 K and 200 K respectively. Calculate the temperature of the foil after the steady state is reached, assuming the spheres to be perfect black body radiators. Also determine the rate of energy transfer between one of the spheres and the foil. **CO2**

21. Explain Van der Waals corrections to the Ideal Gas equation and the resulting equation of state. **CO3**

SECTION – D

Answer any ONE question **1 x 12 = 12 Marks**

22. Explain Joule-Thomson effect on the basis of the porous plug experiment. **CO3**

23. Explain Linde's process for the liquefaction of air. **CO3**

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Dept. of Physics | **I Physics** | **Time: 2 Hours**
Vivekananda College | **Semester II** | **Date:06.03.2019**
Tiruvedakam West | **II Internal Test** | **Max. Marks: 50**

Optics & Sound –06CT22

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. The bending or spreading of waves that encounter an object in their path is called
   a) Interference b) Diffraction c) Polarization d) refraction **CO2**
2. Diffraction based on the wave theory was explained by
   a) Fresnel b) Fraunhofer c) Thomas Young d) Bragg **CO2**
3. The Bragg's law relation $2d \sin\theta =$ _____
   a) $m\lambda$ b) $\alpha\lambda$ c) $\omega^2\lambda$ d) zero **CO2**
4. A photograph of an interference pattern in three dimensional images is called _____
   a) pixel b) Hologram c) holography d) bar code **CO2**
5. Hologram is the result of
   a) Interference of object and reference beam b) Polarization of object and reference beam
   c) Diffraction of object and reference beam d) Both polarization and diffraction of object and reference beam **CO2**
6. Each part of hologram contains information about
   a) entire object b) particular part of the object
   c) important part of the object d) front side of the object **CO2**
7. Hologram is the result of
   a) Interference of object and reference beam b) polarization of object and reference beam
   c) diffraction of object and reference beam d) both polarization and diffraction of object and reference beam **CO2**
8. X-ray diffraction can only be applied to
   a) Gaseous or vapour materials b) solid, crystalline materials c) liquids d) all of the above **CO2**
9. X-ray diffraction can only be applied to
   a) Gaseous or vapour materials b) solid, crystalline materials c) liquids d) all of the above **CO2**
10. Splitting of white light in to constituent colours is called
    a) diffraction b) refraction c)reflection d) dispersion **CO2**

SECTION – B

Answer any FIVE questions **5 x 2 = 10 Marks**

11. What is grating? **CO2**
12. Define resolving power of the grating. **CO2**
13. What is X-ray? **CO2**
14. State Bragg's law. **CO2**
15. What is holography? **CO2**
16. Write about Fresnel interpretation on diffraction. **CO2**
17. Wrtie down the general formula for the minima in the diffraction pattern **CO2**

SECTION – C

Answer any THREE questions **3 x 6 = 18 Marks**

18. Distinguish between Fresnel and Fraunhofer diffraction. **CO2**
19. Derive the formula for the minima in the single slit diffraction. **CO2**
20. Derive the relation for intensity in single slit diffraction. **CO2**
21. How many orders will be visible if the wavelength of the incident radiation is 5000Å and the number of lines on the grating is 2620 in one inch. **CO2**
22. Write a note on Holography. **CO2**
23. Calculate the minimum number of lines per cm in a 2.5 cm wide grating which will just resolve the sodium lines (5890Å and 5896Å) in the second order spectrum. **CO2**

SECTION – D

Answer any ONE questions **1 x 12 = 12 Marks**

23. Explain the production of x-rays and the use of x-ray diffraction in sodium chloride structure analysis **CO2**
24. Explain the theory of double slit interference and diffraction combined. **CO2**

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Dept. of Physics	**II B.Sc., Physics**	**Time: 2 Hours**
Vivekananda College	**Semester IV**	**Date: 01–03–2019**
Tiruvedakam West	**II Internal Test**	**Max. Marks: 50**

ANALOG ELECTRONICS – 06CT41

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. The knee voltage of a crystal diode is approximately equal to ……
   a) Applied voltage b) breakdown voltage c) forward voltage d) barrier potential
2. If the temperature of a crystal diode increases then leakage current……
   a) remains the same b) decreases c) increases d) becomes zero
3. A zener diode is used as
   a) An amplifier b) a rectifier c) an oscillator d) a voltage regulator
4. A transistor has …….
   a) one *pn* junction b) two *pn* junction c) three *pn* junction d) four *pn* junction
5. The input impedance of a transistor is ……
   a) high b) low c) very high d) almost zero
6. 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) $I_E = I_C + I_E$
7. The base of a transistor is ____ doped
   a) heavily b) lightly c) very lightly d) moderately
8. The relation between $\beta = 100$ and α is …….
   a) $\beta = \frac{1}{1-\alpha}$ b) $\beta = \frac{1-\alpha}{\alpha}$ c) $\beta = \frac{\alpha}{1-\alpha}$ d) $\beta = \frac{\alpha}{1+\alpha}$
9. Which of the following device has lowest noise-level
   a) triode b) ordinary c) tetrode d) JEFT
10. A JEFT is similar in operation ……valve.
    a) diode b) pentode c) triode d) tetrode

SECTION – B

Answer ANY FIVE questions **5X 2 = 10 Marks**

11. What is the maximum efficiency of half wave rectifier and full wave rectifier?
12. What is a transistor?
13. Name the three possible transistor connections.
14. What is transistor biasing?
15. Define stability factor.
16. List out the different connections of JFET.
17. Write the expression for drain current by bias battery method.

SECTION – C

Answer ANY THREE questions **3 X 6 = 18 Marks**

18. Distinguish between JFET and bipolar transistor.
19. Derive an expression for the efficiency of full wave rectifier.
20. Describe a method used for transistor biasing with neat circuit diagram.
21. Explain the principle and working of JFET.
22. A JFET has a drain current of 5 mA. If $I_{DSS} = 10$ mA and $V_{GS(off)} = -6V$, find the value of
    (i) V_{GS} and (ii) V_P

SECTION – D

Answer ANY ONE question **1 X 12 = 12 Marks**

23. Discuss the performance of transistor amplifier.
24. Explain the important parameters of JFET.

Dept. of Physics | **II B.Sc., Physics** | **Time: 2 Hours**
Vivekananda College | **Semester IV** | **Date: 06–03–2019**
Tiruvedakam West | **II Internal Test** | **Max. Marks: 50**

MATHEMATICAL PHYSICS – 06CT42

SECTION – A

Answer All questions **10 x 1 = 10 Marks**

1. Polynomial Interpolation is used to compute
   a) values of argument b) integration c) differentiation d) all the above
2. Which among the following is correct?
   a) $E = 1 + \Delta$ b) $E = 1 - \Delta$ c) $E = \Delta$ d) $E = \Delta - 1$
3. Gauss forward interpolation formula is applicable if u = _____
   a) zero b) one c) between 0 and 1 d) None
4. 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
5. _____ is the process of finding the most appropriate estimate for missing data.
   a) Finite difference b) Iterative c) Interpolation d) None
6. _____ formula is the average of Gauss forward and Gauss backward interpolation formula.
   a) Weddle's b) Stirling's c) Trapezoidal d) None
7. Gauss forward interpolation formula is used to interpolate the values of y for _____.
   a) $0 < p < 1$ b) $-1 < p < 0$ c) $-\frac{1}{2} < p < \frac{1}{2}$ d) None
8. Gauss backward interpolation formula is used to interpolate the values of y for values of p lying between _____.
   a) 0 and 1 b) – 1 and 0 c) – 1 and 1 d) None
9. Newton's forward interpolation formula is used to interpolate the value of y _____.
   a) Near the beginning b) Near the end c) Near the middle d) None
10. Newton's backward interpolation formula is used to extrapolate the values of y to the _____ of the last tabulated value.
    a) Right b) Left c) Middle d) None

SECTION – B

Answer any FIVE questions **5 x 2 = 10 Marks**

11. What do you mean by Interpolation?
12. Define Interpolation function or smoothing function.
13. Define Interpolation polynomial or collocation polynomial.
14. Why do we prefer polynomial interpolation?
15. Write Gauss-forward interpolation formula in tabular form
16. $\binom{r}{u}$ = ?
17. How do we use the difference table for Gauss backward interpolation formula?

SECTION – C

Answer any THREE questions **3 x 6 = 18 Marks**

18. 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

Age x :	45	50	55	60	65
Premium y :	114.84	96.16	83.32	74.48	68.48

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

x :	0	1	2	3	4	5	6	7
y :	1	2	4	7	11	16	22	29

20. The following data are taken from steam table

Temp ^{0}C:	140	150	160	170	180
Pressure kgf/cm^2:	3.685	4.854	6.302	8.076	10.225

Find the pressure at temperature $t = 142^0$ and $t = 172^0$

21. Apply Gauss's forward formula to find f(x) at x = 3.5 from the table below

x :	2	3	4	5
f(x) :	2.626	3.454	4.784	6.986

22. If $\sqrt{12500} = 111.803399$ $\sqrt{12510} = 111.848111$ $\sqrt{12520} = 111.892805$ $\sqrt{12530} = 111.937483$
    Find $\sqrt{12516}$ by Gauss's Backward formula

SECTION – D

Answer any ONE question **1 x 12 = 12 Marks**

23. Derive Gregory-Newton forward interpolation formula
24. From the following table, find the value of **tan 45^0 15'**

x^0 :	45	46	47	48	49	50
tan x^0 :	1.00000	1.03553	1.07237	1.11061	1.15037	1.19175

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Dept. of Physics | **III B.Sc., Physics** | **Time: 2 Hours**
Vivekananda College | **Semester VI** | **Date: 04.03.2019**
Tiruvedakam West | **II Internal Test** | **Max. Marks: 50**

Nuclear Physics – 06CT61

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. Redshift measurements of a galaxy yield a recession of 1700 km/s. Hubble's constant H is 23 km/s/10^6c·y. The distance to the galaxy is approximately
   a) 36 X 10^6 c·y b) 47 X 10^6 c·y c) 74 X 10^6 c·y d) 53 X 10^6 c·y
2. The charge of the particle *dds* is
   a) e b) –e c) (1/3) e d) - (1/3) e
3. The cosmic microwave background radiation comes from
   a) quasars b) the Big Bang c) the solar nebula d) radio galaxies
4. If the average density of the Universe were greater than the critical density, the Universe would
   a) continue to expand forever b) continue to contract forever c) eventually stop contracting and begin expansion d) eventually stop expanding and then contract
5. Which one of the following does the Big Bang Theory imply?
   a) The Universe started with a big explosion b) The universe was created 1 million years ago
   c) The Universe will end in a big explosion d) The Universe is very noisy
6. For neutron detection, the ionization chamber is filled with
   a) sulphur dioxide vapour b) chlorine dioxide vapour c) carbon dioxide vapour d) boron trifluoride vapour
7. For Geiger – Muller counter, the efficiency of the counter is defined as the ratio of the observed
   a) counts / sec b) counts / minute c) counts / day d) counts / year
8. The Betatron is a device to accelerate
   a) protons b) electrons c) neutrons d) mesons
9. Radioactivity was discovered by
   a) Henri Becqerel b) Rutherford c) Maxwell d) Bohr
10. The atoms of radioactive elements emit radiations composed of three distinct kinds of rays
    a) alpha, beta and proton b) alpha, beta and x-rays c) alpha, beta and neutron
    d) alpha, beta and gamma

SECTION – B

Answer any FIVE questions **5 x 2 = 10 Marks**

11. State Hubble's law
12. What are the observations which support Big-Bang theory?
13. Express critical density in terms of Hubble's parameter
14. What is counting efficiency?
15. Give the two limitations of the Wilson Cloud Chamber
16. State natural radioactivity
17. What are Gamma Rays?

SECTION – C

Answer any THREE questions **3 x 6 = 18 Marks**

18. Explain the thermal history of the Universe
19. Elucidate the future of the Universe in terms of critical density
20. Describe the construction and working of an ionisation chamber
21. A self-quenched G-M counter operates at 1000 volts and has a wire diameter of 0.2 mm. The radius of the cathode is 2 cm and the tube has a guaranteed lifetime of 10^9 counts. What is the maximum radial field and how long will the counter last if it is used on an average for 30 hours per week at 3000 counts per minute? Consider 50 weeks to a year.
22. Write down the various properties of alpha rays?

SECTION – D

Answer any ONE questions **1 x 12 = 12 Marks**

23. Elaborate the significance of Quark model in Particle Physics in detail
24. Discuss about the construction, theory of the Betatron

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Dept. of Physics	**III B.Sc., Physics**	**Time: 2 Hours**
Vivekananda College	**Semester VI**	**Date: 05–03–2019**
Tiruvedakam West	**II Internal Test**	**Max. Marks: 50**

MODERN PHYSICS – 06EP61

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. D'Alembert's principle is given by
   a) $\sum_i (F_i - \dot{p}_i) \cdot \delta r_i = 0$ b) $\sum_i F_i \cdot \delta r_i = 0$ c) $\sum_i \dot{p}_i \cdot \delta r_i = 0$ d) $\sum_i (F_i - p_i) \cdot \delta r_i = 0$
2. Hamilton's principle is
   a) $\delta \int_{t_1}^{t_2} (T-V)dt = 0$ b) $\delta \int_{t_1}^{t_2} Tdt = 0$ c) $\delta \int_{t_1}^{t_2} Vdt = 0$ d) $\delta \int_{t_1}^{t_2} (T+V)dt = 0$
3. The Lagrangian for a linear harmonic oscillator is
   a) $m\ddot{x} + kx = 0$ b) $m\ddot{x} = 0$ c) $k\ddot{x} = 0$ d) $k\dot{x} = 0$
4. The Lagrangian for a simple pendulum is
   a) $\ddot{\theta} + (g / l)\,\Theta = 0$ b) $\ddot{\theta} = 0$ c) $g\Theta = 0$ d) $l\ddot{\theta} = 0$
5. The Lagrangian for Atwood's machine is
   a) $\ddot{x}_1 = [(m_1 - m_2) / (m_1 + m_2)]g$ b) $\ddot{x}_1 = m_1 - m_2$ c) $\ddot{x}_1 = m_1 + m_2$ d) $\ddot{x}_1 = m_1 / m_2$
6. In Lagrangian formulation independent variables are
   a) generalized coordinates b) time c) both a and b d) generalized velocity
7. In Hamiltonian's canonical equations of motion, the momentum coordinate p_j is represented as $\dot{p}_i$ = __
   a) $\partial H / \partial p_j$ b) $-\partial H / \partial q_j$ c) $\partial H / \partial \dot{q}_j$ d) $\partial L / \partial t$
8. According to special theory of relativity which one is not an absolute quantity?
   a) Time b) mass c) length d) temperature
9. Formula for length contraction is $l =$ ___
   a) $l_o(1+v^2/c^2)^{-1/2}$ b) $l_o(1-v^2/c^2)^{1/2}$ c) $l_o(1-c^2/v^2)^{-1/2}$ d) $l_o(1-c^2/v^2)^{1/2}$
10. An object moving with the speed of light, the mass of an object is
    a) zero b) infinity c) finite d) not measurable

SECTION – B

Answer any FIVE questions **5 X 2 = 10 Marks**

11. Define Phase space.
12. Mention the conditions necessary for Hamiltonian H to represent total energy E.
13. What is the advantage of Hamiltonian approach?
14. Distinguish between Lagrangian and Hamiltonian.
15. Write the formula for n-generalized momenta.
16. State the postulates of special theory of relativity.
17. What is Minkowski's space?

SECTION – C

Answer any THREE questions **3 X 6 = 18 Marks**

18. Derive Hamilton's canonical equations of motion.
19. Find the equation of motion of one dimensional harmonic oscillator using Hamilton's principle.
20. A particle of mass M moves on a plane in the field of force given by $F = -r\,k\,r\cos\theta$, where k is constant and r is the radial unit vector. Will the angular momentum of the particle about the origin be conserved? Justify your statement.
21. Derive the Einstein's mass energy relation.
22. Find the de Broglie wavelength associated with (i) A 46 gm golf ball with velocity 36 m/s (ii) an Electron with velocity 107 m/s. Which of these two show wave character and why?

SECTION – D

Answer any ONE question **1 X 12 = 12 Marks**

23. For a conservative system obtain Lagrange's equations of motion from Hamilton's principle.
24. Deduce the formula for relativistic variation of mass with velocity. Briefly explain its significance.

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Dept. of Physics	**II B.Sc., Physics**	**Time: 1 Hour**
Vivekananda College	**Semester VI**	**Date: 28.02.2019**
Tiruvedakam West	**II Internal Test**	**Max. Marks: 25**

ASTROPHYSICS – 06SB41

SECTION – A

Answer all questions **5 X 1 = 5**

1. Stars whose variation are only apparent and are caused by obscuration of their light by stars or dust have been called _____

   a) Intrinsic variables b) extrinsic variables c) pulsating variables d) exploding variables

2. Stars, in which changes of brightness are the results of the physical changes occurring inside are known as _____

   a) Intrinsic variables b) extrinsic variables c) pulsating variables d) exploding variables

3. The explosive burning of hydrogen on the surface of white dwarf produces a

   a)Supernovae b) novae c) pulsar d) visual binary stars

4. The nature of the stars can be detected through a telescope is _____

   a) Visual binary b) Spectroscopic binaries c) Spectrum binaries d) eclipsing binaries

5. The period of revolution of the sirus star was found to be _____

   a) 45.9 years b) 49.5 years c) 54 .9 years d) 94.5 years

SECTION – B

Answer any two questions **2 x 2 = 4**

6. What is Doppler effect?
7. What is Zeeman effect?
8. List out the interior and outer layers of the sun.
9. Write down the classification of binary stars.

SECTION – C

Answer any one question **1 x 6 = 6**

10. Discuss about the pulsating variable stars.
11. Expalin Hubble space telescope.

SECTION – D

Answer any one question **1 x 10 = 10**

12. Explain in detail about visual binary.
13. Explain the three categories of stars on the basis of their closeness and mutual orientation as seen by the observer.

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Dept. of Physics	**III B.Sc., Physics**	**Time: 1 Hour**
Vivekananda College	**Semester VI**	**Date: 26.02.2019**
Tiruvedakam West	**II Internal Test**	**Max. Marks: 25**

NANOTECHNOLOGY – 06SB61

SECTION – A

Answer all questions **5 X 1 = 5**

1. Which of the following is an example of top-down approach for the preparation nanomaterials?
   a) Gas phase agglomeration b) Molecular self-assembly
   c) Mechanical grinding d) Molecular beam epitaxy
2. The properties like melting point, solubility, color, etc changes on varying the
   a) Size b) Composition c) Surface properties d) None of the mentioned
3. Which of the following is the principal factor which causes the properties of nanomaterials to differ significantly from other materials?
   a) Size distribution b) Specific surface feature
   c) Quantum size effects d) All the mentioned
4. The power required for electro-deposition is
   a. DC and very low voltage b. DC and high voltage
   c. AC and very low voltage d. AC and high voltage
5. Sol-gel is _____ approach
   a). Bottom-up b) Top-Down c) sputtering d) chemical vapour deposition

SECTION – B

Answer any two questions **2 x 2 = 4**

6. List out the various types of crystal structures.
7. Classify the bottom-up approaches.
8. Mention some characterization techniques to analyse nonmaterial.
9. What do you mean by synthesis of nonmaterial?

SECTION – C

Answer any one question **1 x 6 = 6**

10. Explain about the role of bottom-up and top- down approaches in nanotechnology.
11. Write down about any three crystal structures and its properties.

SECTION – D

Answer any one question **1 x 10 = 10**

12. Discuss briefly about the Sol-gel process.
13. Explain about the electro deposition method

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Dept. of Physics | **III B.Sc., Physics** | **Time: 1 Hour**
Vivekananda College | **Semester VI** | **Date: 27.02.2019**
Tiruvedakam West | **II Internal Test** | **Max. Marks: 50**

PHYSICS FOR COMPETITIVE EXAMINATIONS – 06SB62

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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-forth 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. e^2g/m^2
6. A diople of electric dipole moment P is placed in a uniform electric field of strength E. If θ is the angle between positive directions of P and E, then the potential energy of the electric dipole is largest when θ is
A. zero B. π/2 C. π D. π/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. none of the above
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 X 10^7 m/s B. 18.7 X 10^7 m/s C. 0.187 X 10^7 m/s D. 187 X 10^7 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 μF are joined in parallel. The resultant capacitance of combination is
A. 8 μF B. 4 μF C. 2 μF D. 1 μF
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 is
A. 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 Ω , 4 Ω and 6 Ω connected in parallel is
A. 12/11 Ω B. 11/12 Ω C. 12 Ω D. 0 Ω
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^2R B. nR C. R/n D. R/n^2
19. In a Wheatstone bridge the resistances in the ratio arms are 100 Ω and 150 Ω respectively. If R= 80 Ω , the resistance of the fourth arm will be
A. 120 Ω B. 80 Ω C. 150 Ω D. 70 Ω
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
A. is doubled B. reduces to one-fourth of its initial value C. remains unchanged
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 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 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 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/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 inductor 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. ωL B. $1/\omega L$ C. $\omega^2 L^2$ D. ωLR
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. $\frac{1}{2\pi}\sqrt{\frac{C}{L}}$
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 Ω 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= $\sqrt{3}$ Ω , X_L = 10 Ω, X_C = 11 Ω, the applied voltage is 10 Volt (R.M.S). The impedance of the circuit is
A. 8 Ω B. 4 Ω C. 2 Ω D. 1 Ω

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Dept. of Physics	**III B.Sc., Physics**	**Time: 1 Hour**
Vivekananda College	**Semester VI**	**Date: 28–02–2019**
Tiruvedakam West	**II Internal Test**	**Max. Marks: 25**

MEDICAL INSTRUMENTATION – 06SB63

SECTION – A

Answer All questions **(5 X 1 = 5 Marks)**

1. Electric charges are transferred between one nerve fiber and other through a dendrite of a Post Synaptic neuron during the release of _____
   a) current b) acetylcholine c) graded potential d) blood

2. On the surface of the brain, the voltage is about
   a) 10 μV b) 100 μV c) 10 mV d) 100 mV

3. Root of the nose is called
   a) nasion b) inion c) scalp d) cortex

4. Servo Controlled Ventilators work in _____ mode.
   a) Assisted b) Assisted-control c) Controlled d) Pressure control

5. _____ is used to measure the volume of exhaled air.
   a) Spirometer b) Humidifier c) Nebulizer d) Ventilator

SECTION – B

Answer Any Two questions **(2 X 2 = 4 Marks)**

6. What is called epilepsy?
7. What is the frequency range of alpha waves?
8. Write down the combination used in anesthetic nitrous oxide.
9. What is the use of humidifier?

SECTION – C

Answer any ONE question **(1 X 6 = 6 Marks)**

10. Describe anatomy of brain.
11. List out the techniques used in surgical diathermy.

SECTION – D

Answer any ONE question **(1 X 10 = 10 Marks)**

12. Draw the modern EEG unit.
13. Draw the block diagram of a ventilator with its accessories.

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Dept. of Physics | **I B.Sc., Maths/Chemistry** | **Time: 2 Hours**
Vivekananda College | **Semester II** | **Date: 11.04.2019**
Tiruvedakam West | **III Internal Test** | **Max. Marks: 50**

Allied Physics - II – 06AT02

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. The Einstein's equation is **CO3**
a) $E = mc^3$ b) $E = mc$ c) $E = mc^2$ d) $E = mc^4$

2. The explosion of an atom bomb releases tremendously large quantity of energy in the form of **CO3**
c) heat, light and radiation b) heat, light and sound c) heat, fire and radiation
d) heat, friction and sound

3. The energy released in fusion is **CO3**
a) 23.64 MeV b) 23.84 MeV c) 25.64 MeV d) 22.45 MeV

4. The magnetic moment due to electron spin is equal to ___ Bohr magnetron **CO2**
a) One b) two c) three d) four

5. Direct evidence for the existence of magnetic moments of atoms and their space quantisation is provided by the experiment _____ **CO2**
a) Jaegars method b) Michelson c) Stern-Geralch d) Laurent's polarimeter

6. The vector atom model is an extension of _____ **CO2**
a) Bohr atom model b) Rutherford atom model
c) Bohr- Sommerfeld atom model d) none of these

7. Which of the following are not noble gases? **CO2**
a) Argon b) xenon c) zinc d) krypton

8. L-S coupling also referred to as **CO2**
a) Russel- brown coupling b) Russel-saunders coupling
c) Russel-arnold coupling d) Luther- spin coupling

9. The Size of the atom is of the order of **CO2**
a) 10^{-14} m b) 10^{-10} m c) 10^{-8} m d) 10^{-6} m

10. The Size of the nucleus is of the order of **CO2**
a) 10^{-14} m b) 10^{-10} m c) 10^{-8} m d) 10^{-6} m

SECTION – B

Answer any FIVE questions **5 x 2 = 10 Marks**

11. Define the term nuclear fission **CO3**

12. Give the principle of Atom bomb **CO3**

13. Write a note on magnetic dipole moment due to spin **CO2**

14. Write down the two concepts of vector atom model. **CO2**

15. State Pauli's exclusion principle. **CO2**

16. Calculate the value of Bohr magnetron, h=6.6 $x10^{-34}$ joules second, m=9.1 $x10^{-31}$ kg, e = 1.6 $x10^{-19}$ coulomb **CO2**

17. The experimental value of Bohr magnetron is 9.21 x 10^{-24} SI units and h=6.6 $x10^{-34}$ joules second. Calculate the value of e/m of an electron. **CO2**

SECTION – C

Answer any THREE questions **3 x 6 = 18 Marks**

18. Give a brief account of nuclear energy **CO3**

19. Explain the construction and working of an ionization chamber **CO3**

20. Calculate the binding energy of an alpha particle and express the result both in MeV and joules **CO3**

21. Write a note on coupling schemes. **CO2**

22. Explain Pauli's exclusion principle in detail. **CO2**

SECTION – D

Answer any ONE questions **1 x 12 = 12 Marks**

23. Describe the principle, parts, construction and working of a nuclear reactor **CO3**

24. Explain the different quantum numbers associated with the vector atom model. **CO2**

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Dept. of Physics | **I B.Sc., Physics** | **Time: 2 Hours**
Vivekananda College | **Semester II** | **Date: 08.04.2019**
Tiruvedakam West | **III Internal Test** | **Max. Marks: 50**

THERMODYNAMICS & STATISTICAL MECHANICS – 06CT21

SECTION – A

Answer ALL questions **10 X 1 = 10 Marks**

1. The value of probability of an event cannot be **CO4**
   a) zero b) 1 c) ½ d) negative
2. If a card is chosen from a standard deck of cards, what is the probability of getting a 5 or a 7? CO4
   a) 4/52 b) 1/26 c) 8/52 d) 1/169
3. The thermodynamic probability of a system in equilibrium is CO4
   a) maximum b) minimum but not 1 c) 1 d) zero
4. The particles obeying Maxwell-Boltzmann statistics are CO4
   a) identical b) identical and indistinguishable c) distinguishable d) photons
5. The root mean square speed of gas molecules of mass m at a given temperature T is proportional to CO4
   a) m^0 b) $m^{1/2}$ c) $m^{-1/2}$ d) m
6. Deduction of Planck's law is possible on the basis of CO5
   a) Fermi-Dirac (FD) Statistics b) classical statistics c) Maxwell-Boltzmann (MB) Statistics
   d) Bose-Einstein (BE) Statistics
7. Pauli's exclusion principle applies to CO5
   a) M.B. statistics b) F.D. statistics c) B.E. statistics d) classical statistics
8. Thermal radiations are in general CO5
   a) infrared radiation b) UV radiation c) gamma radiation d) beta radiation
9. In F.D. statistics, the volume of a cell in six dimensional phase space is CO5
   a) h^3 b)h^6 c) h^{-6} d) h^{-3}
10. Fermi energy E_F depends on CO5
    a) size of the conductor b) volume of the conductor c) electron concentration of the conductor
    d) electrical resistance of the conductor

SECTION – B

Answer any FIVE questions **5 x 2 = 10 Marks**

11. Define probability. CO4
12. What is the significance of additive law of probability? CO4
13. What is a phase space? CO4
14. Explain the Boltzmann's entropy relation. CO4
15. State any two postulates of BE statistics. CO5
16. Write short notes on Photon gas. CO5
17. Define the term Fermi energy. CO5

SECTION – C

Answer any THREE questions **3 x 6 = 18 Marks**

18. State and prove theorem of equipartition of energy. CO4
19. Applying MB distribution show that the internal energy of an ideal monoatomic gas depends only on its temperature. CO4
20. Starting from FD distribution law, derive an expression for energy distribution of free electrons in a metal. CO5
21. The first excited state of hydrogen atom is 10.2 eV above its ground state. What temperature is needed to excite hydrogen atoms to the first excited level? CO4
22. Calculate the Fermi energy at absolute zero temperature. CO5

SECTION – D

Answer any ONE question **1 x 12 = 12 Marks**

23. Derive Maxwell-Boltzmann energy distribution law starting from first principles. CO4
24. Explain in detail the difference between MB, BE and FD statistics. CO5

Dept. of Physics | **I Physics** | **Time: 2 Hours**
Vivekananda College | **Semester II** | **Date: 12.04.2019**
Tiruvedakam West | **III Internal Test** | **Max. Marks: 50**

Optics & Sound –06CT22

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. Plane polarised light can be produced by
   a) Simple reflection b) nicol's prism c) pile of plates d) all of the above
2. The phenomenon by which the incident light falling on a surface is sent back into the same medium is known as ____
   a) Polarization b) reflection c) refraction d) absorption
3. Brewster's angle is when
   a) reflected light is completely polarised light b) reflected light is partially polarised
   c) no light is reflected d) angle between incident and reflected light is 90 degrees
4. A particle moves in a circular path, with a uniform speed. Its motion is
   a) periodic b) simple harmonic c) oscillatory d) angular simple harmonic
5. The motion of a torsional pendulum is
   a) periodic b) simple harmonic c) oscillatory d) all the above
6. The unit for angular frequency ω is _____
   a) radian / second b) radian / hour c) degree / second d) degree / hour
7. Sound and light waves both
   a) have similar wavelength b) obey the laws of reflection
   c) travel as longitudinal waves d) travel through vacuum
8. If a system vibrates at a number of frequencies, the lowest frequency is the ____frequency
   a) fundamental b) multiple c) single d) minimum
9. Sound levels are measured in units of _____
   a) frequency b) decibels c) newton d) pascal
10. In fluids, sound waves are _____
    a) Longitudinal b) transverse c) resonance d) frequency

SECTION – B

Answer any FIVE questions **5 x 2 = 10 Marks**

11. What is dichroic material?
12. What is optical activity?
13. Write down some properties of sound waves.
14. Define sound level in a logarithmic scale of intensity.
15. What is harmonics?
16. Write about acoustics?
17. What is damped harmonic motion?

SECTION – C

Answer any THREE questions **3 x 6 = 18 Marks**

18. Describe the process of polarization by reflection
19. Describe the theory of interference in sound waves
20. i) A quartz quarter wave plate is to be used with sodium light of wavelength λ =589 nm. What is the minimum thickness of such a plate? Given the refractive indices of the ordinary and extraordinary wave are n_o=1.544 ; n_e =1.553
    ii) A sound wave of frequency 10 kHz is travelling in air with a speed of 340 ms^{-1}. Find the minimum separation between two points where the phase difference is 60^0.
21. i) A particle of mass 200g executes a SHM. The restoring force is provided by a spring of spring constant 80Nm^{-1}. Find the time period.
    ii) A particle of mass 40 g executes a simple harmonic motion of amplitude 2.0cm. If the time period is 0.20s. Find the total mechanical energy of the system.
22. Describe the working of Simple Pendulum

SECTION – D

Answer any ONE questions **1 x 12 = 12 Marks**

23. Illustrate the phenomena of double refraction
24. Solve the equation of motion of Simple Harmonic Oscillator

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Dept. of Physics	**II B.Sc., Physics**	**Time: 2 Hours**
Vivekananda College	**Semester IV**	**Date: 08–04–2019**
Tiruvedakam West	**III Internal Test**	**Max. Marks: 50**

ANALOG ELECTRONICS – 06CT41

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. The most widely used rectifier is ……..
   a) half-wave rectifier b) Centre – tap full – wave rectifier
   c) bridge full- wave rectifier d) full wave rectifier
2. A Zener diode is …… device.
   a) a non-linear b) a linear c) an amplifying d) a rectifying
3. The input impedance of a transistor is ……
   a) high b) low c) very high d) almost zero
4. A JEFT is also called ……. Transistor.
   a) unipolar b) bipolar c) unijunction d) tripolar
5. The operating point is also called the
   a) cut off point b) quiescent point c) saturation point d) active point
6. The noise factor of an ideal amplifier expressed in *db* is……..
   a) 0 b) 1 c) 0.1 d) 10
7. RC coupling is used for
   a) voltage amplification b) current amplification
   c) power amplification d) voltage stabilization
8. The base resistor method is generally used in ……
   a) amplifier circuits b) switching circuits c) rectifier circuits d) regulator circuits
9. Hartley oscillator is commonly used in ……..
   a) radio receiver b) radio transmitter c) TV receiver d) FM transmitter
10. In a Colpitt's oscillator, feedback is obtains……
    a) by magnetic induction b) by the tickler coil
    c) from the centre of split capacitor d) from the centre of induction

SECTION – B

Answer ANY FIVE questions **5X 2 = 10 Marks**

11. What is Phase reversal?
12. Define resonant frequency.
13. What are Barkhausen criteria?
14. Define faithful amplification.
15. What is transistor biasing?
16. How a quartz crystal works?
17. Draw the circuit for an operational amplifier unity follower.

SECTION – C

Answer ANY THREE questions **3 X 6 = 18 Marks**

18. In a phase shift oscillator $R_1=R_2=R_3=1M\Omega$ and $C_1=C_2=C_3= 68$ pF. At what frequency does the circuit oscillate?.
19. Describe the base resistor method of transistor biasing.
20. Explain the operation of transistor as an amplifier.
21. Distinguish between the JFET and Bipolar transistor.
22. What are the applications of Operational Amplifier?

SECTION – D

Answer ANY THREE questions **1 X 12 = 12 Marks**

23. With neat circuit diagram, explain the action of Hartley's oscillator.
24. Explain the working of R-C coupled transistor Amplifier.

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Dept. of Physics	**II B.Sc., Physics**	**Time: 2 Hours**
Vivekananda College	**Semester IV**	**Date: 12–04–2019**
Tiruvedakam West	**III Internal Test**	**Max. Marks: 50**

MATHEMATICAL PHYSICS – 06CT42

SECTION – A

Answer All questions **10 x 1 = 10 Marks**

1. 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) $u = x x_0 / h$

2. Any given function $y = f(x)$ is rearranged into collocation polynomial $y = Pn(x)$ in the case of

   a) Interpolation b) numerical differentiation c) numerical integration d) All the above

3. The general Newton-Cote's quadrature formula specialized to trapezoidal rule by putting

   a) $n = 0$ b) $n = 1$ c) $n = 2$ d) $n = 3$

4. If we put $n = 3$ in Newton-Cote's formula we get

   a) Trapezoidal rule b) Simpson's one-third rule

   c) Simpson's three-eighths rule d) Romberg method

5. The error is Trapezoidal rule is of order _____.

   a) h b) h^2 c) h^3 d) None

6. The error is Simpson's 1/3 rule is of order _____.

   a) h^2 b) h^3 c) h^4 d) None

7. Put n = _____ is Newton's Cote's quadrature formula to get weddle's rule.

   a) 2 b) 4 c) 6 d) None

8. The accuracy of the Trapezoidal rule can be improved by the number of intervals.

   a) Decrease b) Increase c) None

9. Addition of vector with its reversed direction is called

   A. vector addition B. vector subtraction C. vector division D. vector multiplication

10. Graphical representation of vectors is a directed line segment with

    A. direction B. point C. circle D. arrowhead

SECTION – B

Answer any FIVE questions **5 x 2 = 10 Marks**

11. Write Newton-Cote's quadrature formula
12. Where do we use trapezoidal rule?
13. What is the necessary condition to apply Simpson's one-third rule?
14. Name the two laws obeyed by vector addition.
15. Define vector.
16. Define scalar.
17. Write down commutative law and associative law.

SECTION – C

Answer any THREE questions **3 x 6 = 18 Marks**

18. The table given below reveals the velocity 'v' of a body during the time 't' specified. Find its acceleration at **t = 1.1**

t :	1.0	1.1	1.2	1.3	1.4
v :	43.1	47.7	52.1	56.4	60.8

19. A rod is rotating in a plane. The following table gives the angle 'θ' (in radians) through which the rod has turned for various values of time t (sec). Calculate the angular velocity and angular acceleration of the rod at 0.6 sec

t :	0	0.2	0.4	0.6	0.8	1.0
θ :	0	0.12	0.49	1.12	2.02	3.20

20. Evaluate $\int_{-3}^{3} x^4 \, dx$ by using i) Trapezoidal rule ii) Simpson's rule

21. Evaluate $I = \int_{0}^{6} 1 / (1 + x) \, dx$ using i) Trapezoidal rule ii) Simpson's rule

22. A river is 80 m wide. The depth 'd' in metres at a distance '**x**' metres from one bank is given by the following table. Calculate the area of cross section of the river using Simpson's rule

x :	0	10	20	30	40	50	60	70	80
d :	0	4	7	9	12	15	14	8	3

SECTION – D

Answer any ONE question **1 x 12 = 12 Marks**

23. Derive the Newton's forward difference formula to get the derivative

24. Find the first two derivatives of $(x)^{1/3}$ at x = 50 and x = 56 given the table below

x	50	51	52	53	54	55	56
$y = x^{1/3}$	3.6840	3.7084	3.7325	3.7563	3.7798	3.8030	3.8259

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Dept. of Physics | **III B.Sc., Physics** | **Time: 2 Hours**
Vivekananda College | **Semester VI** | **Date: 10.04.2019**
Tiruvedakam West | **III Internal Test** | **Max. Marks: 50**

Nuclear Physics – 06CT61

SECTION – A

Answer ALL questions **10 X 1 = 10 Marks**

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 β – ray spectrum in 1934
   a) Newton b) Rutherford c) Fermi d) Bohr
3. The mean life of a radioactive substance is the reciprocal of the decay constant
   a) M b) N c) T d) λ
4. The curie is defined as the quantity of a radioactive substance which gives
   a) 3.70×10^{10} disintegrations / second b) 3.70×10^{5} disintegrations / second
   c) 3.70×10^{8} disintegrations / second d) 3.70×10^{3} disintegrations / second
5. The first transmutation of nitrogen in to oxygen was achieved and established by
   a) Rutherford b) Newton c) Bohr d) Maxwell
6. To trace path of phosphorus, isotope of phosphorus which is added to fertilizers, is
   a) P^{31} b) P^{32} c) P^{33} d) P^{34}
7. Circulatory disorder in blood vessels is studied by injecting
   a) radio-cobalt b) radio-sulphur c) radio-sodium d) radio-iodine
8. The half-life of neutron is
   a) 13 hours b) 13 minutes c) 13 seconds d) 13 days
9. Thermal neutrons from nuclear reactors have de-Broglie wavelengths of the order of
   a) 18.2 nm b) 1.82 mm c) 18.2 A° d) 1.82 A°
10. Fast neutrons are neutrons with energies range between 0.5 to
    a) 10 MeV b) 5 MeV c) 50 MeV d) 1 MeV

SECTION – B

Answer any FIVE questions **5 x 2 = 10 Marks**

11. Define range of alpha particles
12. State Geiger's law
13. What is mean life?
14. Write a short note on units of radioactivity
15. How electron is distinguished from positron?
16. Elucidate four kinds of fundamental interactions between elementary particles.
17. Differentiate between fast neutrons and slow neutrons.

SECTION – C

Answer any THREE questions **3 x 6 = 18 Marks**

18. Give a brief account of the magnetic spectrograph with a neat diagram
19. Explain the discovery of artificial transmutation
20. The half-value period of radium is 1590 years. In how many years will one gram of pure element (a) lose one centigram, and (b) be reduced to one centigram?
21. Write a concise account on the discovery of neutrons.
22. Explain various mechanisms of production and detection of neutrons.

SECTION – D

Answer any ONE question **1 x 12 = 12 Marks**

23. Describe the experimental measurement of the range of alpha particles.
24. Write an essay on the production and applications of radio-isotopes.

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Dept. of Physics	**III B.Sc., Physics**	**Time: 2 Hours**
Vivekananda College	**Semester VI**	**Date: 11–04–2019**
Tiruvedakam West	**III Internal Test**	**Max. Marks: 50**

MODERN PHYSICS – 06EP61

SECTION – A

Answer All questions **10 X 1 = 10 Marks**

1. According to Einstein, energy of electromagnetic wave is concentrated in
   a) protons b) electrons c) photons d) neutrons
2. The energy of a photon is directly related to
   a) frequency b) intensity c) wave number d) time period
3. Critical frequency is one _____ which no photoelectrons are emitted.
   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. In classical mechanics the future of a particle is completely determined by its_____
   a) initial position b) momentum c) forces d) all the above
6. A normalized wave function obeys the equation
   a) $\int_{-\infty}^{\infty} |\psi|^2 dV = 0$ b) $\int_{-\infty}^{\infty} |\psi|^2 dV = 1$ c) $\int_{-\infty}^{\infty} \psi \, dV = 0$ d) $\int_{-\infty}^{\infty} \psi \, dV = 1$
7. The square of the absolute magnitude of wave function $|\psi|^2$ is always a _____ quantity.
   a) positive real b) negative real c) zero d) unity
8. In the case of sound wave, the variable quantity is the
   a) displacement b) pressure difference c) electric field d) magnetic field
9. In the case of light wave, the variable quantity is
   a) electric field b) magnetic field c) a or b d) displacement
10. In the case of a wave in a stretched string, the variable quantity is _____ of the string from the x-axis.
    a) pressure difference b) displacement c) electric field d) magnetic field

SECTION – B

Answer any FIVE questions **5 X 2 = 10 Marks**

11. Write any two points about wave function.
12. When does a wave function is said to be normalized?
13. Mention the characteristics of well behaved wave function.
14. Write down the general wave equation.
15. Write down Heisenberg uncertainty principle
16. What is called De Broglie waves?
17. What is the suggestion for negative results of Michelson Morley experiment?

SECTION – C

Answer any THREE questions **3 X 6 = 18 Marks**

18. Discuss about linearity and superposition of Schrodinger's equation.
19. Discuss about momentum and energy operators.
20. Verify that $y = A\, e^{-\omega(t-x/v)}$ is a solution of the wave equation.
21. Derive the equations for group and phase velocity of De Broglie wave
22. An electron is in a box 0.10 nm across, which is the order of magnitude of atomic dimensions. Find its permitted energies.

SECTION – D

Answer any ONE question **1 X 12 = 12 Marks**

23. Derive Schrodinger's equation in Time Dependent form.
24. Describe the experimental verification of de Broglie waves by Davisson-Germer experiment.

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Dept. of Physics **I B.A/B.Sc** **Time : 2 hours**
Vivekananda college **II - Semester** **Date : 10-04-2019**
Tiruvedakam west **Max. Marks : 50**

ELECTRICAL HOME APPLIANCES -06NE21

SECTION – A

Answer All Questions

Multiple choice questions: (10 × 1 = 10)

1. The term AC stands for
   a) Automatic Current b) Alternating Current c) All Current d) Available Current
2. The definition of Ohm's law is V = -----
   a) I x R b) I - R c) I / R d) I^2 x R
3. The frequency of Direct current is
   a) 0 Hz b) 40 Hz c) 50 Hz d) 70 Hz
4. ----------is an inductance coil which is used to control the current in an ac circuit
   a) resistance b) capacitance c) choke d) rheostat
5. The incandescent lamps are classified according to the material used for the
   a) current b) glass c) resistance d) filament
6. The LED's operate at low voltages i.e., from ---------
   a) 1.5 to 2.5 V b) 2.5 to 3.5 V c) 5.0 to 7.0 V d) 7.0 to 8.0 V
7. An electric heater is an electrical appliance that converts electrical energy in to
   a) sound b) light c) heat d) all the above
8. The normal human body temperature is
   a) 36.9 °C b) 100.0 °C c) 60.0 °C d) 56.9°C
9. The combination of the nichrome are
   a) nickel and chlorine b) nickel and chromium c) sodium and aluminium d) aluminium and steel
10. The fan converts a significant portion of the electrical energy into the ---------- of the fan blades
    a) Kinetic energy b) potential energy c) sound energy d) heat energy

SECTION – B

Answer any FIVE questions (5 x 2 = 10)

11. Define the term current
12. Write a note on the neutral
13. Give the name of transformer types
14. Preference of choke coil over an ohmic resistance for diminishing the current why?
15. Give any two applications of Light Emitting Diode

15.What is an electric heater?

16. Give a short note on instant water heater
17. Difference between table fan and ceiling fan

SECTION – C

Answer any THREE questions (3 x 6 = 18)

18. Explain the single phase and two phase power supply
19. Differentiate between Alternating Current and Direct Current
20. Comparison of fluorescent tube and filament lamp with a neat tabulation
21. Explain the role of seven segment display
22. Explain the various parts and working principle of an electric iron box

SECTION – D

Answer any ONE question (1 x 12 = 12)

23. What is transformer? Briefly describe its construction. What are the advantages of using transformers?
24. Briefly explain the construction, working principle and use of the incandescent lamps. Give neat sketches

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Dept. of Physics	**II B.Sc., Physics**	**Time: 1 Hour**
Vivekananda College	**Semester VI**	**Date: 06.04.2019**
Tiruvedakam West	**III Internal Test**	**Max. Marks: 25**

ASTROPHYSICS – 06SB41

SECTION – A

Answer all questions **5 X 1 = 5**

1. Hubble's law deals with _____ of the galaxies
   a) blue shift b) red shift c) radius d) momentum
2. Big bang theory is continuously
   a) Not evolving b) constant c) evolving d) none
3. Edwin Hubble classified the galaxies according to their apparent than actual ____
   a) Shapes b) volumes c) masses d) sizes
4. The darker region of the sunspot is_____
   a) Chromospheres b) photosphere c) Umbra d) transition region
5. The lighter region of sunspot is _____
   a) Core b) penumbra c) umbra d) corona

SECTION – B

Answer any two questions **2 x 2 = 4**

6. Define cosmic rays.
7. What is red shift?
8. What is solar granulation?
9. List out the types of galaxy.

SECTION – C

Answer any one question **1 x 6 = 6**

10. Explain about the galaxy and its radiation.
11. With neat diagram briefly explain celestial coordinates.

SECTION – D

Answer any one question **1 x 10 = 10**

12. Explain Sunspots in detail.
13. Explain Big Bang theory in detail.

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Dept. of Physics	**III B.Sc., Physics**	**Time: 1 Hour**
Vivekananda College	**Semester VI**	**Date:04.04.2019**
Tiruvedakam West	**III Internal Test**	**Max. Marks: 25**

NANOTECHNOLOGY – 06SB61

SECTION – A

Answer all questions **5 X 1 = 5**

1. Which of the following component used in the AFM?

   a) Cantilever b) Electrode c) diode d) knife

2. An important consequence of using the UV-Visible spectroscopy is that _____ of nanomaterial can be determined.

   a) Emission wavelength b) excitation wavelength c) Band gap d) bonding structure

3. Atomic force microscopy (AFM) is also known as

   a) Scanning probe microscopy (SPM) b) Scanning Electron microscope (SEM)

   b) Electron microscope d) none of the above

4. Sputtering is a_____

   a) Physical Vapour deposition method b) Chemical vapour deposition method

   b) Chemical precipitation method d) Chemical bath deposition method

5. The structured size of nanomaterial is about

   a) 1 to 100 cm b) 1 to 100nm c) 1 to 100μm d) 1 to100 mm

SECTION – B

Answer any two questions **2 x 2 = 4**

6. Define nanocomposite.
7. Mention the types of nanocomposite.
8. What is band gap?
9. What is EDAX?

SECTION – C

Answer any one question **1 x 6 = 6**

10. Illustrate the structural properties using X-Ray diffraction.
11. Discuss briefly about the spray pyrolysis method.

SECTION – D

Answer any one question **1 x 10 = 10**

12. Give a detail account on application of nonmaterials.
13. Describe about surface morphological studies of nanoparticles.

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Dept. of Physics | **III B.Sc., Physics** | **Time: 1 Hour**
Vivekananda College | **Semester VI** | **Date: 05.04.19**
Tiruvedakam West | **III Internal Test** | **Max. Marks: 50**

PHYSICS FOR COMPETITIVE EXAMINATIONS – 06SB62

Time: 1 Hour **Maximum Marks: 50**

1. When a charged particle moves in a transverse magnetic field, its path of motion is
A. parabolic B. circular C. elliptical D. linear

2. The electron beam with velocities in the ratio 1:2 is subjected to identical magnetic fields at right angles to them. The ratio of the deflections produced will be
A. 1:2 B. 2:1 C. 1:4 D. 4:1

3. If elements with principal quantum number n > 4 were not allowed in nature, the number of possible elements would be
A. 60 B. 32 C. 4 D. 64

4. A proton, deuteron, and an α – particle are accelerated by the same potential difference. Their velocities will be in the ratio of
A. 1:1:1 B. √2:1:1 C. 1:1:√2 D. 1:√2:1

5. When cathode rays strike a substance of large atomic weight they give rise to
A. X-rays B. β-rays C. γ-rays D. positive rays

6. According to Bohr's postulates, which of the following quantities takes discrete value?
A. kinetic energy B. potential energy C. angular momentum D. momentum

7. "There are discrete energy levels in atoms and molecules" was first demonstrated experimentally by
A. Frank Hertz experiment B. Rutherford alpha scattering experiment C. Davisson and Germer's experiment D. G.P. Thomson's experiment

8. The order of wavelength of X-rays is
A. 10^{10} m B. 10^{-8} m C. 10^{-12} m D. 10^{-14} m

9. Moleybdenum is used as a target for production of X-rays because it is
A. a heavy element and can easily absorb high velocity electrons B. a heavy element with a high melting point C. an element having high thermal conductivity D. heavy and can easily deflect electrons

10. The intensity of X-rays depends upon
A. kinetic energy of the electron striking the target B. number of electrons striking the target C. total momentum of the electron D. none of the above

11. In radio therapy X-rays are used to
A. detect bone fracture B. treat cancer by control C. detect heart disease D. detect fault in radio receiving circuits

12. Mosley's law relates
A. frequency of the applied voltage B. the same capacitance C. the same potential D. none of the above

13. Bragg's equation will not have solution, if
A. $\lambda > 2d$ B. $\lambda < 2d$ C. $\lambda > d$ D. $\lambda = d$

14. An X-ray has a wavelength of 0.01 A. Its momentum is
A. 3.313 X 10^{-22} kg-m/sec B. 6.626 X 10^{-21} kg-m/sec C. 3.456 X 10^{-25} kg-m/sec D. 2.126 X 10^{-22} kg-m/sec

15. The work function for photoelectric effect depends on
A. depends upon the frequency of incident light B. is same for all metals C. is different for different metals D. none of the above.

16. Work function of molybdenum is 5 eV. If ultraviolet light of wavelength 1000 A falls upon it, the maximum velocity of the ejected photoelectrons will be
(Given : h = 6.6 X 10^{-34} J-s, e = 1.6 X 10^{-19} C , m = 9.1 X 10^{-31} Kg and 1 eV = 1.6 X 10^{-19} J)
A. 1.6 X 10^{6} m/sec B. 1.6 X 10^{4} m/sec C. 1.6 X 10^{5} m/sec D. 1.6 X 10^{2} m/sec

17. Wave nature of matter is not apparent to our daily observations because
A. wavelength of the waves associated with the pretty heavy masses is very small B. wavelength of the waves associated with the pretty heavy masses is very large C. bodies travel with very large velocities D. none of the above

18. An electron is accelerated through a potential difference of V volts. The de Broglie wavelength (λ) associated with the electron is
A. $\frac{12.27}{\sqrt{V}}$ A B. $\frac{12.27}{V}$ A C. $12.27\sqrt{V}$ A D. $\frac{1}{12.27\sqrt{V}}$ A

19. If the de Broglie wavelengths of an alpha particle and neutron are the same, then the velocity of
A. alpha particle is greater than that of neutron B. neutron is greater than that of alpha particle C. both neutron and alpha particle is same D. none of the above.

20. An α – particle and a proton have the same kinetic energy. The ratio of their wavelengths is ($m_\alpha = m_p$)
A. 1:2 B. 2:1 C. 1:4 D. 4:1

21. The de Broglie wavelength of a 1 KeV neutron is
A. 9.04 X 10^{-3} A B. 9.04 X 10^{-5} A C. 9.04 A D. 0.904 A

22. If ΔX and ΔP are uncertainties in the measurement of position and momentum respectively, then according to Heisenberg uncertainty principle
A. $\Delta X \Delta P \geq \eta$ B. $\Delta X \Delta P \leq \eta$ C. $\Delta X \Delta P > \eta^2$ D. $\Delta X \Delta P < \eta^2$

23. The uncertainty principle is applicable only when
A. position is measured after momentum B. momentum is measured after position C. position and momentum are measured simultaneously D. none of the above

24. The uncertainty in the location of a particle is equal to its de Broglie wavelength, then the uncertainty in its velocity will be equal to
A. its velocity B. half of its velocity C. twice its velocity D. four times its velocity
25. The expectation value of an operator is

A. $\langle A \rangle = \int \Psi^* A \Psi d\tau$ B. $\langle A \rangle = \int \Psi^* \Psi d\tau$ C. $\langle A \rangle = A\Psi$ D. $\langle A \rangle = \frac{1}{\int \Psi^* \Psi d\tau}$

26. A spaceship 50 m long was to pass the earth travelling at 2.5 X 10^8 m/sec. Assuming a Lorentz- Fitzgerald contraction, its apparent length will be
A.3 m B.30 m C.300 m D.0.3 m
27. A nucleus of atomic mass A and atomic number Z emits a β particle. The atomic mass and atomic number of the resulting nucleus are
A. A, Z B. A+1,Z C. A,Z +1 D. A-4,Z-2
28. The half life of radioactive radon is 28 days. The time at the end of which 1/20th of the radon sample will remain undecayed, is ($\log_{10} e = 0.4343$)
A. 3.8 days B.16.5 days C. 33 days D. 76 days
29. Sun releases enormous amounts of energies by the process known as
A. fusion B. fission C. spontaneous combustion D. implosion and explosion
30. The isotope generally used for the treatment of blood cancer is
A. I^{131} B. Hg^{197} C. Ag^{191} D. O^{15}
31. Thermionic emission is the phenomenon of
A. emission of electrons B. emission of photons C. emission of neutrons D. emission of protons
32. Tungsten is extensively used for thermionic filament because
A. its work function is the smallest B. it has a very high melting point C. it has low density D. it acts like a black body for filament radiation
33. Pure or intrinsic semi-conductor at absolute zero is
A. perfect insulator B. super conductor C. good conductor D. none of the above
34. P-N diode, when forward biased, behaves as a
A. high resistor B. capacitor C. an on switch D. an off switch
35. Zener diode is used for
A. rectification B. amplification C. stabilization D. none of the above
36. The term transistor stands for
A. transfer of resistance, i.e., the change of resistance B. transfer of voltage C. transfer of power D. none of the above
37. In a transistor the base is made very thin and is hardly doped with an impurity, because
A. to enable the collector to collect about 95% of the holes or electrons coming from the emitter side
B. to enable the emitter to emit small number of holes or electrons C. to save the transistor from high current effect D. none of the above
38. The ratio of atomic radius(r) and lattice parameter(a) of SC system is
A. 2 B. 1/2 C. 1/2√2 D. $\sqrt{3/4}$
39. The coordination number for FCC system is
A. 6 B.8 C. 4 D. 12
40. In a cubic system, which one of the following is most appropriate?
A. all the sides are equal B. the three axes are mutually perpendicular C. three sides are equal and three sides are mutually perpendicular D. none of the above
41. The planet having no atmosphere on it is
A. earth B. venus C. mars D. mercury
42. Stars radiate light of their own because of
A. fission reactions B. chemical reactions C. mechanical contractions D. fusion reactions
43. Hubble's law mathematically expresses as (H → Hubble's constant)
A. velocity = H X distance B. velocity = H X (distance)^2 C. velocity = H/distance
D. velocity = H /(distance)^2
44. If *r* denotes the mean distance of a planet from the sun and *T* the time period of the planet, then
A. $r \propto T^{2/3}$ B. $r \propto T^{3/2}$ C. $r \propto T^{1/3}$ D. $r \propto T$
45. The spectrum of the sun is generally marked by certain dark lines called
A. sun spots B. solar flames C. solar corona D. Fraunhofer lines
46. The binary code of $(21.125)_{10}$ is
A. 10100.001 B. 10101.001 C. 10101.010 D. 10100.100
47. An AND gate is
A. equivalent to a parallel switching circuit B. equivalent to a series switching circuit
C. implements logic addition D. none of the above
48. A half adder can be constructed from
A. one XOR gate and one AND gate B. one XOR gate and one AND gate with their inputs connected in parallel
C. two XOR gates only D. one XOR and one OR gate with their outputs connected in parallel
49. Which of the following is not a sequential circuit?
A. counter B. flip-flop C. multiplexer D. shift register
50. The circuit used for parallel to serial conversion of data is called
A. multivibrator B. multiplexer C. demultiplexer D. none of the above

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Dept. of Physics	**III B.Sc., Physics**	**Time: 1 Hour**
Vivekananda College	**Semester VI**	**Date: 06–04–2019**
Tiruvedakam West	**III Internal Test**	**Max. Marks: 25**

MEDICAL INSTRUMENTATION – 06SB63

SECTION – A

Answer All questions **(5 X 1 = 5 Marks)**

1. The use of superconducting magnets in MRI is to obtain
   a) signals from surface tissues. b) high RF field
   c) high strength gradient fields. d) high strength magnetic field.

2. The Argon-ion Laser is mainly used in coagulation because
   a) it gives necessary power for coagulation.
   b) it gives necessary mono-chromaticity in wavelength which is highly absorbed by red blood cells and hemoglobin.
   c) it is harmless. d) its energy can be easily delivered to the spot where coagulation takes place.

3. Half life period of O-15 is _____ minutes.
   a) 2 b) 10 c) 20 d) 25

4. Radioisotope used for a patient in Gamma-ray camera is
   a) Barium-131 b) C-11 c) N-13 d) O-15

5. Antiparticle of Positron is
   a) Proton b) Electron c) Fermion d) Boson

SECTION – B

Answer Any Two questions **(2 X 2 = 4 Marks)**

6. What is called population inversion?
7. Define spontaneous emission.
8. Define stimulated emission.
9. Give any two advantages of laser surgery.

SECTION – C

Answer any ONE question **(1 X 6 = 6 Marks)**

10. Describe principle of Laser action.
11. Discuss about Positron Emission Tomography(PET).

SECTION – D

Answer any ONE question **(1 X 10 = 10 Marks)**

12. Discuss about Rotameter and Turbine flowmeter.
13. Explain MRI system with block diagram.

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