



## P I C S I N S T I T U T E

### Radiation and dual nature

1. observation on Photoelectric effect (a)effect of intensity (2) effect of potential (3) effect of frequency
2. davisson and germer experiment
3. De Broglie wavelength all th relations.
4. Einstein Photoelectric equation
5. determine Planck's using cut off volte vs is frequency graph?
6. use of photocell

### Electromagnetic waves

1. Show that average energy density of electric field is equal to the average energy density of magnetic field.
2. hertz experiment
3. use of electromagnetic radiation ,radio waves ,microwaves infrared. radiation. ultraviolet radiations ,X Ray and gamma rays
4. importance of ozone layer
5. relation between the amplitude of electric and magnetic field in electromagnetic wave

### Current electricity

1. how will you compare the EMF of two primary cell using potentiometer
2. how will you determine the electrical resistivity of a material of wire using metal Bridge
3. using kirchoff's rule obtain the condition of wheatstone bridge in balanced the state
4. Prove the relation density =  $m/he2T$
5. explain how does the electrical resistivity of a conductor insulator and semiconductor vary with temperature
6. state and prove maximum power theorem
7. state Faraday's laws of electrolysis and derive the relation between chemical equivalent and electrical equivalent .
8. relay relation current and drift velocity
9. describe the principle of potential metre and why does the potential metre prefer over of voltmeter to measure the emf of a cell?
10. how does thermo EMF vary with the temperature
11. the thermo emf develops in Bi- antimony Thermocouple is higher than copper -Iron thermocouples .why
12. write two application of thermoelectricity
13. what is the role of magnese dioxide in a dry cell
14. it is easier to start a car engine on a warm day than on a Chilly day
15. magnese is used for making standard resistors. Why?
16. what is the direction of thermoelectric current in copper- iron Thermocouple
17. draw the variation of thermoelectric power with temperature
- 18 . you have given a colour code resistor of 74 kilo ohms . write the sequence of colours

### Electromagnetic induction and ac circuit

1. Transformers
2. AC generators
3. series LCR circuit impendence resistance phase difference and phase diagram
4. resonance in LCR circuit and average power associated with LCR circuit
5. arrange power associated with inductive circuit
6. mean value of AC over complete cycle

7. RMS value of AC over complete cycle
8. AC circuit containing capacitor only
9. AC circuit containing inductor only
10. distinguish between resistance impedance and reactance
11. calculation of self inductance
12. energy stored in an inductor
13. Eddy current and their use
14. induced EMF by changing the area of loop with respect to magnetic field
15. induced EMF by changing the relative orientation of coil with respect to field
16. Faraday's of electromagnetic induction
17. lenz law is a consequence of conservation of energy principle
18. draw the variation of inductive reactance with frequency of AC source
19. draw the variation of capacitive reactance with the frequency of AC source
20. draw the variation of impedance of series LCR circuit with the frequency of AC source
21. A capacitor make and easy flow to AC but blocks DC why
22. What is the phase difference between applied voltage and current in series LCR circuit at resonance
23. what is the Phase difference between potential difference across inductor and capacitor in LCR circuit
24. Transformer cannot step up DC voltage why
25. A choke is preferred over are registered in AC circuit why?

### Magnetic effect of electric current and Magnetism

1. Moving coil galvanometer
2. Cyclotron
3. using by biot-savart's law find at the current carrying circular loop or coil.
5. by biot-savart's law find the magnetic field due to an infinite really long current carrying wire
6. Using ampere circuital law of find the magnetic field due to current carrying solenoid
7. A charged particle is projected at right angles to the direction of uniform magnetic field .Prove that it undergoes a circular path. Find the expression for its radius time period and kinetic energy.
8. Torque on a current loop suspended in uniform magnetic field
9. Distinguish between diamagnetic paramagnetic and ferromagnetic material
10. Atom as a magnet dipole magnetic revolving electron
11. Potential energy of a magnet
12. curie's law in magnetism
13. Electrons cannot be accelerated by cyclotrone. Why?
14. what is the nature of magnetic field used in moving coil galvanometer
15. On what factors the sensitivity of a moving coil galvanometer depends
16. Finding of new pole strength and dipole moment in different cases
17. Under what condition of proton will experience maximum force
18. under what condition of proton will experience no force in uniform magnetic field

### Optics

- 1 Compound microscope
- 2 refracting telescope
- 3 laws of reflection on the basis of Huygens Principle
- 4 laws of refraction on the basis of Huygens Principle
- 5 expression for fringe width
- 6 Single Split diffraction of light
- 7 prism formula
- 8 reflection of light at spherical surface
- 9 lens Maker's formula
- 10 focal length of combination of two lenses in contact
- 11 labelled diagram of a reflecting telescope and its advantages over refracting telescope
- 12 when a ray of light Travels from dense to rare medium, Prove that is a real -  
 $u = \text{real depth} / \text{apparent depth}$ .
- 13 polarization of light by reflection----- Brewster's law

- 14 Conditions of total internal reflection
- 15 rotation between refractive index and Critical Angle
- 16 describe an experiment to show that light waves are transverse in nature
- 17 Cause of dispersion of light
- 18 twinkling of stars
- 19 total reflecting prism
- 20 malus law and variation of intensity of transmitted light with the angle between the plane of polarized and analysed
- 21 Distinguish between interference and diffraction of light
- 22 Scattering of light----- sky appears blue. why ?

## Atomic physics

- 1 Radioactive decay law and prove that  $N=N_0e^{-kT}$
- 2 Draw the variation of number of Beta particle as a function of its K.E.
- 3 Draw the energy level undergoing beta decay of  ${}_{27}\text{CO}^{60}$  with the Emission of R-rays
- 4 Plot the variation of binding fraction as a function of a mass number.write its consequences and explain nuclear fission and fusion on the basis of this graph.
- 5 How does the neutron to proton ratio change during----  
 (a) Alpha decay (B) Beta decay & (c) Gama decay, with examples.
- 6 Define half life & average life & prove that  $T_{1/2} = 0.693 / k$
- 7 Properties of alpha,beta & gama rays
- 8 characteristics of nuclear force.
- 9 Distance of closest approach =approximate size of a nucleus.
- 10 Properties of proton.
- 11 Prove that density of nuclear matter is independent of its size.
- 12 Energy distribution in beta decay is continuous , why ?
- 13 compare the radii of hydrogen & aluminium nuclei.
- 14 Define impact parameter.
- 15 You have given two nuclei  ${}_{3}\text{X}^4$  &  ${}_{3}\text{X}^7$ . Are they isotopes of same element & which is more stable.

## SOLIDS & SEMICONDUCTOR DEVICES

- 1 Action of NPN transistor & its characteristics.
- 2 NPN common emittee amplifier.
- 3 Transistor as an oscillator.
- 4 Energy bands in solids & distinguish between conductors , insulators & semiconductors on the basis of energy band diagram.
- 5 what is zener diode & explain the use of zener diode as a voltage regulator.
- 6 PN junction diode as half wave rectifier.
- 7 PN junction diode as full wave rectifier.
- 8 Operation of a PN junction diode in forward bias.
- 9 Operation of a PN junction diode in reverse bias.
- 10 Distinguish between P type & N type semiconductors on the basis of energy band diagram.
- 11 Distinguish between photodiode and light emitting diode.
- 12 characteristics of a PN junction diode.
- 13 write the truth table for the following gates----  
 (i) OR (ii) AND (iii) NOT (iv) NAND (v)NOR (vi) XOR (vii) NXOR
- 14 write the truth table-----
- 15 write the truth table-----
- 16 Realisation of OR gate
- 17 Realisation of AND gate.
- 18 Realisation of NOT gate.

## ELECTROSTATICS

1. What do you mean by quantisation of electric charge ?
2. No two electric lines of force can intersect each other, why ?
3. Define dielectric constant in terms of force between two charges.
4. Draw electric lines of force to represent a uniform electric field.
5. To which orientation an electric dipole corresponds in stable equilibrium ?
6. Prove that Coulomb's law obeys Newton's 3rd law of motion.
7. Derive the expression for work done in rotating an electric dipole in uniform electric field.
8. Deduce the expression for electrostatic potential due to an isolated point charge.
9. Show that electric field can be defined as the negative of potential gradient.
10. Capacitance of a parallel plate capacitor.
11. Electric field due to an electric dipole at a point on its axis.
12. Electric field due to an electric dipole at a point on its equatorial line.
13. Force & torque on an electric dipole in uniform electric field.
14. Electrostatic potential at any point due to a short electric dipole.
15. Using Gauss's law-----find the electric field due to an infinitely long line of charge.
16. Using Gauss's law----- find the electric field due to an infinitely thin plane sheet of charge.
17. Energy stored in a capacitor & energy density of parallel plate capacitor.
18. Inserting dielectric slab in parallel plate capacitor ---- prove that  $c = kc_0$
19. Van de Graaff generator.



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