

## CHAPTER 12

### Short Questions

1. What are the factors on which electric flux depends?
2. State the Gauss's law and write its mathematical relation.
3. Define electron volt and show that  $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$ .
4. The time constant of a series RC circuit is  $t = RC$ . Verify that ohm times farad is equivalent to second.
5. Describe the force or forces on a positive point charge when placed between parallel plates with similar and equal charges. Explain briefly.
6. What are the factors on which Coulomb's force between two charges depends?
7. Define permittivity of free space and relative permittivity. Also give their units.
8. If a point charge 'q' of mass 'm' is released in a non-uniform electric field with field lines pointing in the same direction, will it make a rectilinear motion?
9. Write the similarities and dissimilarities between electric force and gravitational force.
10. Draw a graph for charging and discharging of a capacitor in case of R-C circuit.
11. Is it true that Gauss's law states that the total number of lines of force crossing any closed surface in the outward direction is proportional to the net positive charge enclosed within surface? Explain.
12. Define the time constant of a capacitor.
13. How the orbits of planets will be modified if they were electrically charged?
14. Is  $\mathbf{E}$  necessarily zero inside a charged rubber balloon if the balloon is spherical? Assume that charge is distributed uniformly over the surface.
15. The potential is constant throughout a given region of space. Is the electric field zero or non-zero in this region? Explain.
16. Do electrons tend to go to a region of high potential or low potential?
17. Write any two characteristics of electric field lines.
18. Define electric polarization and electric dipole.
19. Electric lines of force never cross. Why?
20. Suppose that you follow an electric field line due to positive point charge. Do electric field and the potential increase or decrease? Explain.
21. Define potential gradient and give its S.I. units.
22. Prove that Coulomb's Law obeys third law of motion.
23. List the properties of electric field lines.
24. Show how  $\text{Vm}^{-1}$  and  $\text{NC}^{-1}$  are equivalent units for electric field intensity.

### Long Questions

1. State the Gauss's law and apply it to find electric field intensity due to an infinite sheet of charge / two oppositely charged parallel plates.
2. What is a capacitor? Derive the expression for energy density for a capacitor which has electric field strength 'E'.
3. Derive an expression for the potential at a certain point in the field of a positive point charge.
4. State and explain the Coulomb's law. Also describe the effect of medium between the two charges on the Coulomb's force between them.
5. Describe the applications of electrostatics including Xerography and Inkjet printers.

6. Define electric potential and its unit. Also derive an expression for electric field as a potential gradient.
7. How can the charge on an electron determined by employing the Millikan's method?
8. Define capacitance and its unit. Also explain the charging and discharging process of a parallel plate capacitor.

## **CHAPTER 13**

### **Short Questions**

1. Define electrolysis and state the basic principle of electroplating.
2. A potential difference is applied across the ends of a copper wire. What is the effect on drift velocity of free electrons by decreasing the length and the temperature of the wire?
3. List and briefly explain four kinds of current sources.
4. What is a voltmeter? Define its two electrodes.
5. Define ohmic and non-ohmic devices and give examples.
6. What is a thermistor? Give its applications.
7. Describe a circuit which will give continuously varying potential.
8. Define electronic current and conventional current.
9. Briefly explain Kirchhoff's second rule for an electric circuit.
10. Distinguish between resistivity and conductivity.
11. What are the difficulties in testing whether the filament of a lighted bulb obeys Ohm's law?
12. What is a potentiometer? Give its two uses.
13. What is meant by tolerance? Find the resistance of a resistor with red, green orange, and gold respective bands.
14. Two charged particles are projected into a region where there is a magnetic field perpendicular to their velocities. If the charges are deflected in opposite directions, what can you say about them?
15. Why does the resistance of a conductor rise with temperature?
16. Write two uses of rheostat and draw their diagrams.
17. Define temperature coefficient of resistance and write its formula and units.

### **Long Questions**

1. State Ohm's Law and derive its expression. Discuss why filament of a lighted bulb is non-ohmic by graph. Also give any two example of non-ohmic devices.
2. What is Wheatstone bridge? How can it be used to determine unknown resistance?
3. What is a Rheostat? Describe its two applications.
4. Explain the circuit and working of a potentiometer.

## **CHAPTER 14**

### **Short Questions**

1. How can the sensitivity of a galvanometer be increased?
2. What are the factors on which the force on a current carrying conductor in a magnetic field depends upon?
3. How can you convert a galvanometer into a voltmeter?
4. At a given instant, a proton moves in positive x direction in a region where there is a magnetic field in the negative z direction. What is the direction of the magnetic field? Will the proton continue to move in positive x direction? Explain.
5. A loop of wire is suspended between poles of a magnet with its plane parallel to the pole faces. What happens if a direct current is put through the coil? What happens if an alternating current is used instead?
6. Why the resistance of an ammeter should be very low?
7. Define the permeability of free space and give its units.
8. Give the dimensions of permeability of free space.
9. How can you use magnetic field to separate isotopes of a chemical element?
10. What is digital multimeter? Give its two advantages over AVO meter.
11. Draw saw tooth voltage waveform and explain it.
12. Define (i) tesla and (ii) weber.
13. What is a dead beat galvanometer and why is it more desirable?
14. What should be the orientation of a current carrying coil in a magnetic field so that torque acting upon the coil is: (a) maximum, (b) minimum?
15. Is it possible to obtain an isolated north pole? Give reasons.
16. Why does the picture of a TV screen become distorted when a magnet is brought near the screen?
17. How can a current loop be used to determine the presence of magnetic field in a given region of space?
18. What is CRO? Write the name of any four main parts of it.
19. Is it possible to orient a current loop in a uniform magnetic field such that the loop will not tend to rotate? Explain briefly.
20. List the uses of a cathode ray oscilloscope.
21. If a charged particle 'q' is moving in a region with velocity 'v' where there is an electric field 'E' and magnetic field 'B', find the total force on the particle.
22. What is Lorentz force? Write it in mathematical expression.
23. Why voltmeter should have a very high resistance?
24. State Ampere's Law and write it in mathematical form.
25. Define electromagnetism and give the name of one device in which electromagnetism is used.

### **Long Questions**

1. State Ampere's law and apply it to find the field due to a current carrying solenoid.
2. Describe a galvanometer. How it is converted into an ammeter and a voltmeter?
3. How can the e/m value of an electron be determined? Explain.
4. Derive the expression for the force acting on a moving charge in a magnetic field.
5. What is a Cathode Ray Oscilloscope? Explain its construction, working and uses.
6. Describe the construction and working of a galvanometer.

7. Write notes on: (i) Ammeter, (ii) Voltmeter (iii) Ohmmeter
8. What is a Multimeter? Describe its various parts and their applications.

## **CHAPTER 15**

### **Short Questions**

1. What are the dimensions of mutual inductance?
2. If number of turns in a solenoid is doubled, keeping the other factors constant, how does the self-inductance change?
3. How can induced current be increased?
4. What is motional emf. Write its mathematical relation.
5. Can an electric motor be used to drive an electric generator with output from the generator being used to operate the motor?
6. Distinguish between slip rings and split rings.
7. Does the induced emf always act to decrease the magnetic flux through a circuit?
8. State the Lenz's law and define henry.
9. Why transformers are used in AC Supply network?
10. In a transformer, there is no transfer of charge from the primary to the secondary coil. How is then the power transferred?
11. Four unmarked wires emerge from a transformer. What steps would you take to determine the turns ratio?
12. What is back motor effect in generators? Explain.
13. When an electric motor such as electric drill, is being used, does it also act as a generator? If so what is the consequence of this?
14. Can a DC motor be turned into a DC generator? What changes are required to be done?
15. Is it possible to change both the area of the loop and magnetic field passing through the loop and still not have an induced emf in the loop?
16. Show that emf ( $\epsilon$ ) and  $h$  have the same units.
17. State Faraday's law and write it in mathematical form.
18. Define self-inductance and self-induction.
19. List the factor on which mutual inductance depends.
20. Give the two techniques to improve the efficiency of a transformer.
21. In a certain region the earth's magnetic field points vertically down. When a plane flies due north, which wingtip is positively charged? Explain.
22. Does induced emf in a circuit depend on the resistance of the circuit?

### **Long Questions**

1. What is inductor? Also derive a formula for energy stored in an inductor.
2. What is transformer? Describe its principle, construction and working.
3. Describe motional emf and derive an expression for it.
4. State and derive the Faraday's law of electromagnetic induction.
5. Describe mutual induction and derive an expression for it.
6. Describe self-induction and derive an expression for it.
7. Explain the principle and working of an AC generator.
8. Describe a DC motor. What is the back emf effect in motors?

**Chapter-16**  
**Short Questions**

1. Define resonance frequency? Give its equation.
2. Define chock? Give its uses.
3. How does the voltage output of a generator change with its angular velocity?
4. With reference to modulation, give the difference b/w information and carrier?
  1. What is a chock coil and why it is used in AC circuit?
  2. How much energy is consumed by a chock when an AC is passed through its? Explain .
  3. Define impedance of a circuit and give its unit?
  4. Define chock and give its uses?
  5. With reference to modulation the difference b/w the information and carrier?
  6. Define reactance? Describe the condition which will make the resistance small.
  7. Define FM and draw its diagram?
  8. Draw a block diagram of common type of metal detector?
  9. Define impedance?
  10. Differentiate b/w single phase and three phase AC supply?
  11. Voltage is leading the current by a phase difference of  $90^0$  . show it by sinusoidal wave diagram?
  12. Define impedance and write its SI unit?
  13. Define reactance and impedance?
  14. Define phase lag and phase lead of an AC?
  15. Find the angle of impedance of a RL series circuit?
  16. What is modulation ? name its types.
  17. What is an inductor?
  18. When a 50 V is applied to an AC circuit the current flowing through it is 50 ma . find the impedance?
  19. Differentiate b/w peak value and peak to peak value?
  20. What do you mean by root mean square value (rms)?
  21. What is the main reason for the world wide use of AC?
  22. What is meant by phase difference?
  23. In relation  $V=V_0 \sin\theta$  , what angle  $\theta$  show?
  24. How does doubling the frequency effect the reactance of a capacitor ?
  25. Which quantity, voltage or current leads in a capacitor and by how much angle?
  26. Define reactance of an inductor and write its formula?
  27. Write two properties of R-L-C series circuit?
  28. Write four properties of parallel resonance circuit?
  29. Write down two advantages of phase AC supply.
  30. What is meant by A.M? Explain.
  31. Write down advantages and disadvantages of A.M and F.M?
  32. Define instantaneous value?
  33. Differentiate b/w AC circuit and DC circuit?
  34. Define power factor?
  35. Why is power dissipated zero in pure inductive and pure capacitive circuit?
  36. A sinusoidal current has r.m.s (effective) value of 10 A. What is the maximum or peak value?
  37. Name the device that will (a) permit flow of direct current but oppose the flow of alternating current (b) permit flow of alternating current but not the direct current.
  38. How many times per second will an incandescent lamp reach maximum brilliance when connected to a 50 Hz source?

39. A circuit contains an iron-cored inductor, a switch and a D.C. source arranged in series. The switch is closed and after an interval re-opened. Explain why a spark jumps across the switch contacts?
40. How does doubling the frequency affect the reactance of (a) an inductor (b) a capacitor?
41. In a R-L circuit, will the current lag or lead the voltage? Illustrate your answer by a vector diagram.
42. A choke coil placed in series with an electric lamp in an A.C. circuit causes the lamp to become dim. Why is it so? A variable capacitor added in series in this circuit may be adjusted until the lamp glows with normal brilliance. Explain, how this is possible?
43. Explain the conditions under which electromagnetic waves are produced from a source?
44. How the reception of a particular radio station is selected on your radio set?
45. What is meant by A.M and F.M.?

### **Long Questions**

1. Discuss A.C through resistor in detail?
2. Discuss A.C through Capacitor in details?
3. Discuss A. C through an Inductor in details?
4. Discuss in details R-C and R-L series circuits?
5. What is series resonance circuit? Write its characteristics?
6. What is parallel resonance circuit? Write its characteristics?
7. Write a note on three phase AC?
8. What is modulation? Discuss its types in detail?



**Chapter-17**  
**Short Questions**

1. What is meant by hysteresis loss?
2. What are ferromagnetic and dia-magnetic substances?
3. What are super –conductor?
4. Distinguish b/w conductors, insulators and semi-conductors with the help of the energy band theory?
5. Define unit cell and give the number of basic crystal system ?
6. Distinguish a donor atom from acceptor atom?
7. Describe briefly about the formation of energy bands in semi-conductor?
8. Define stress and strain and give their SI unit?
9. What are the glassy solids? Do you possess property of flow?
10. What is coercivity of material?
11. Differentiate b/w ductile and brittle substance. Give an Example of each?
12. Distinguish b/w elasticity and plasticity?
13. How conductivity of semi-conductor can be raised?
14. Explain what is Curie temperature?
15. What does area of hysteresis loop tell?
16. Define unit cell and crystal lattice?
17. Define modulus of elasticity?
18. Define ultimate tensile strength (UTS) and fracture stress?
19. Define any two types of elastic constant?
20. Show that unit of modulus of elasticity and stress are same?
21. Explain briefly insulator on the basic energy band theory?
22. Define (a) Conductor band (b) valence band
23. Draw the figure showing electrical conductor by holes in a semi-conductor?
24. Define (a) superconductor (b) Critical temperature
25. Which are the responsible factors for production of magnetic field in an atom?
26. Differentiate b/w critical temperature and critical curie temperature?
27. Differentiate b/w proportional limit and elastic limit?
28. What are squids?
29. Distinguish b/w soft and hard magnetic material?
30. Distinguish between crystalline, amorphous and polymeric solids.
31. Define stress and strain. What are their SI units? Differentiate between tensile, compressive and  
and
32. shear modes of stress and strain.
33. Define modulus of elasticity. Show that the units of modulus of elasticity and stress are
34. same. Also discuss its three kinds.
35. Draw a stress-strain curve for ductile material and then define terms: Elastic limit, Yield point and ultimate tensile stress.
36. What is meant by strain energy? How can it be determined from force-extension graph?
37. Describe formation of energy bands in solids, Explain difference amongst electrical behavior of conductors, insulators and semiconductors in terms of energy band theory.
38. Distinguish between intrinsic and extrinsic semi conductors. How would you obtain n-type and p-type material from pure silicon? Illustrate it by schematic diagram.
39. Discuss the mechanism of electrical conduction by holes and electrons in a pure semiconductor element.

40. Write note on super conductors.
41. What is meant by Para, Dia and ferromagnetic substances? Give examples for each.
42. What is meant by Hysteresis loss? How it is used in construction of a transformer?

### **Long Questions**

1. Write a note on Elastic limit and yeild strength in detail with the graphical explanation?
2. Discuss strain energy in deformed materials and drive its expression?
3. Discuss energy band theory in detail with proper diagram?
4. Discuss hysperisis loop in detail with diagram?

**Chapter-18**  
**Short Questions**

1. What is a transistor? How n-pn transistor circuit is drawn in a common emitter configuration?
2. Draw a circuit symbol for n-pn & p-n-p transistor?
3. Give four applications of a photodiode?
4. What is potential barrier? What is the value of potential barrier for Se and Ge?
5. What is an op-amplifier?
6. Give any two characteristics of op operational amplifier?
7. Draw a diagram of exclusive OR gate?
8. What is meant by forward biased pn-junction?
9. What is photocell? Write its four uses.
10. Draw a circuit diagram of a full wave rectification.
11. Define depletion region and potential barrier?
12. How will you obtain N-type and P-type material from pure silicon?
13. Draw input and output wave forms of half wave and full wave rectifier.
14. Define  $\beta$  from transistor. Also write its fundamental current unit?
15. Define open loop gain of an operational amplifier? Also give its formula.
16. Write some important uses of operational amplifier?
17. What is the principle of virtual ground? Apply it to find the gain of an inverting amplifier.
18. The input of the gate are 1 and 0 Identify the gate if its output is (a) 0 (b) 1
19. What is the mathematical expression of AND gate? Write its truth table.
20. Write down the logic expression and table for exclusive OR gate.
21. Write down symbols and truth table of exclusive NOR gate.
22. Define rectification? Draw a circuit diagram for half wave rectifier.
23. What is LED? Write its uses.
24. How does the motion of an electron in an n-type substance differ from the motion of holes in p-type substance?
25. What is the net charge on a n-type and p-type substances?
26. The anode of a diode is 0.2V positive with respect to its cathode. Is it forward biased?
27. Why charge carriers are not present in the depletion region?
28. What is effect of forward and reverse biasing of a diode on the width of depletion region?
29. Why ordinary silicon diode do not emit light?
30. Why a photodiode is operated in reverse state?
31. Why is base current in a transistor very small?
32. What is biasing requirements of the junction of a transistor for its normal operation? Explain how these are met in common emitter amplifier.
33. What is principle of virtual ground? Apply it to find the gain of an inverting amplifier.
34. The inputs of a gate are 1 and 0. Identify the gate if its output is (a), 0, (b), 1.

### **Long Questions**

1. What is rectification? Write a note on half wave rectification?
2. What is rectification? Write a note on full wave rectification?
3. What is transistor? Write a note on n-pn transistors?
4. What is transistor? Write a note on p-n-p transistor?
5. Write a note on transistor as an amplifier?
6. Write a note on transistor as a switch?
7. Discuss in detail as operational amplifier?
8. Write a note on OP-AMP as Inverting Amplifier?
9. Write a note on OP-AMP as Non-Inverting Amplifier?

**Chapter-19**  
**Short Questions**

1. Write three results of special theory of relativity.
2. If an electron and proton have same de-broglie wavelength. Which particle has greater speed?
3. We do not notice the de-broglie wavelength for a pitched cricket ball. Explain why?
4. Define frame of reference? Differentiate inertial frame from non inertial frame.
5. What advantages an electron microscope has over an optical microscope?
6. How the time dilation effect the aging process of human body?
7. Since mass is a form of energy, can we conclude that a compressed spring has more mass than spring when it is not compressed?
8. Why is cavity radiator consider as black body?
9. Two postulates of special theory of relativity.
10. Define pair production and annihilation of matter?
11. What do we mean by  $E=mc^2$ ?
12. Define relative motion?
13. Write some important uses of photocells?
14. Write the advantages of NAVSTAR navigation system?
15. Define special theory of relativity and write its postulates?
16. Distinguish b/w general theory relativity and special theory of relativity?
17. When light shine on a surface, is momentum transferred to the metal surface?
18. Define stopping potential and threshold frequency?
19. What is stopping potential?
20. What do you understand by work function and stopping potential?
21. Define Compton effect write the formula of Compton shift for scattering angle  $\theta$ ?
22. What is Compton shift in the wavelength of a photon scattered at an angle of  $90^\circ$ ?
23. What is condition of pair production?
24. Write equation of pair production?
25. When does light behave as a wave? When does it behave as a particle?
26. State uncertainly principle? Give its two mathematical forms.
27. Give two statements of uncertainly principle.
28. What are the measurements on which two observers in relative motion will always agree upon?
  
29. Does the dilation means that time really passes more slowly in moving system or that is only seems to pass more slowly?
30. If you are moving in a spaceship at a very high speed relative to earth, would you notice a difference (a), in your pulse rate (b) in pulse rate of people on Earth?
31. If the speed of light were infinite, what would the equations of special theory of relativity reduce to?
32. Since mass is a form of energy, can we conclude that a compressed spring has more mass than the same spring when it is not compressed?
33. As a solid is heated and begins to glow, why does it first appear red?
34. What happens to total radiation from a black body if its absolute temperature is doubled?
35. A beam of red light and a beam of blue light have exactly the same energy. Which beam contains the greater number of photons?
36. Which photon, red, green, or blue carries the most (a) energy and momentum?

37. Which has the lower energy quanta? Radio waves or x-rays.
38. Does the brightness of a beam of light primarily depend on the frequency of photons or on the number of photon?
39. When ultraviolet light falls on certain dyes, visible light is emitted. Why does this not happen when infra-red light falls on these dyes?
40. Will bright light eject more electrons from a metal surface than dimmer light of the same colour?
41. Will smaller frequency light eject greater number of electrons than low frequency light?
42. When light shines on a surface, is momentum transferred to the metal surface?
43. Why can red light be used in a photographic dark room when developing films, blue or white light cannot?
44. Photon A has twice the energy of photon B. what is the ratio of the momentum of A to that of B?
45. Why don't we observe a Compton effect with visible light?
46. Can pair production take place in vacuum? Explain.
47. Is it possible to create a single electron from energy? Explain.
48. If electrons behave only like particles, what pattern would you expect on the screen after the electrons passes through the double slit?
49. If an electron and a proton have the same de Broglie wavelength, which particle has greater speed? We do not notice the de Broglie wavelength for a pitched cricket ball. Explain why?
50. If the following particles all have the same energy, which has the shortest wavelength? Electron, alpha particle, neutron, proton.
51. When does light behave as a wave? When does it behave as a particle?
52. What advantages an electron microscope has over an optical microscope?
53. If measurements show a precise position for an electron, can those measurements show precise momentum also? Explain.

### **Long Questions**

1. What is black body radiation and discuss Intensity distribution diagram?
2. Write a Note on Photoelectric effect?
3. Discuss compton's effect in detail?
4. Discuss Davissan and Germer Experiment in detail?

**Chapter-20**  
**Short Questions**

1. Write a note on CAT scanner?
2. Write some uses of laser in medicine and industry?
3. Differentiate an orbital electron from a free electron?
4. In what regions of electromagnetic spectrum are following series of hydrogen spectrum observed.
5. How does stimulated emission differ from spontaneous emission?
6. How does  $K_{\alpha}$  X-ray differ from a  $K_{\beta}$  X-rays?
7. What is difference b/w Bremsstrahlung radiation and characteristic X-rays in production?
8. Write any two postulates of Bohr's model of H-atom?
9. What happen when an electron loses all its energy in X-rays?
10. Write is de-broglie interpretation of Bohr's orbit?
11. Differentiate b/w ground state, excited state and ionized state of an atom?
12. Describe the type of spectra and give its example?
13. Find the shortest wavelength of Blammers series?
14. Differentiate b/w line spectrum and band spectrum?
15. Define continuous spectra and line spectra?
16. In which region of electromagnetic spectrum does the following series fall.
17. Define excitation energy and ionization energy?
18. Define characteristic X-rays and continuous X-rays?
19. What is meant by stimulated emission?
20. What is meant by normal population and population inversion?
21. Explain what is difference b/w laser light and incandescent light?
22. What is spectroscopy?
23. Why population inversion and laser action are necessary for laser production?
24. Bohr's theory of hydrogen atom is based upon several assumptions. Do any of these assumptions contradict classical physics?
25. What is meant by a line spectrum? Explain, how line spectrum can be used for the identification of elements?
26. Can the electron in the ground state of hydrogen absorb a photon of energy 13.6 eV and greater than 13.6 eV?
27. How can the spectrum of hydrogen contain so many lines when hydrogen contains one electron?
28. Is energy conserved when an atoms emits photon of light?
29. Explain why a glowing gas gives only certain wavelength of light and why that gas is capable of absorbing the same wavelength? Give a reason why it is transparent to other wavelengths?
30. What do you mean when we say that the atom is excited?
31. Can X-rays be reflected, diffracted and polarized just like any other waves? Explain.
32. What are the advantages of lasers over ordinary light?
33. Explain why laser action could not occur without population inversion between atomic levels?

### **Long Questions**

1. Discuss Bohar's Model in detail for hydrogen atom?
2. What is Quantized radii and Quantized energy derive its expression and numerical value?
3. Write a Note on X-Rays Production?
4. Write a Note on Laser in detail?



**Chapter-21**  
**Short Questions**

1. Define Decay constant?
2. What are the main parts of the nuclear reactor?
3. Define half life of a radioactive element?
4. Prove that  $1\mu = 931 \text{ Mev}$ .
5. Which element has maximum binding energy per nucleon value and also write its values?
6. What do you mean by "Dead Time" of a Geiger counter?
7. What is mean by Mass defect and binding energy?
8. Define atomic number and mass number?
9. How do alpha and beta ionize an atom?
10. Define (a) Curie (b) Becquerel
11. Differentiate b/w Leptons and Hadrons?
12. What is nuclear chain reaction? Explain.
13. What are background radiations? Write their two sources.
14. What are quarks? Explain.
15. Protons and neutrons are formed what type of quarks? Show by diagram.
16. Define Isotopes? Give two examples.
17. How much energy is released when 1 amu is converted into energy?
18. What is radio activity?
19. Define half of an element with example?
20. What is the relation b/w decay constant  $\lambda$  and half life  $T_{1/2}$  of a radio active element?
21. What change occurs when a radioactive nuclear emits X-particle?
22. Write three types of interaction of various types of radiation with matter?
23. What is fluorescence? Name two fluorescence substances.
24. Define fission and fusion reaction?
25. Differentiate b/w controlled and un-controlled chain reaction?
26. What are the uses of nuclear reactor?
27. State advantages and disadvantages of nuclear power?
28. What do you mean by critical mass and critical volume?
29. What are the basic forces? Write the name of basic sources of nature.
30. What are the subatomic particles?
31. What are Hadrons? Give example.
32. What are leptons? Give example.
33. Protons and neutrons are formed by what type of quarks? Show by diagram.
34. What are isotopes? What do they have in common and what are their differences?
35. Why are heavy nuclei un-stable?
36. If a nucleus has a half-life of 1 year, does this mean that it will be completely decayed after 2 years? Explain.
37. What fraction of a radioactive sample decays after two half-lives have elapsed?
38. The radioactive element Ra has a half-life of  $1.6 \times 10^3$  years. Since the Earth is about 5 billion years old, how can you explain why we still can find this element in nature?
39. Describe a brief account of interaction of various types of radiations with matter.
40. Explain how  $\alpha$ - and  $\beta$ -particles may ionize an atom without directly hitting the electrons? .
41. What is the difference in the action of the two particles for producing ionization?
42. A particle which produces more ionization is less penetrating, why?

43. What information is revealed by the length and shape of the tracks of an incident particle in Wilson cloud chamber?
44. Why must a Geiger Muller tube for detecting  $\alpha$ -particles have a very thin end window? Why does a Geiger Muller tube for detecting  $\gamma$ -rays not need a window at all?
45. Describe the principle of operation of a solid state detector of ionizing radiation in terms of generation and detection of charge carriers.
46. What do we mean by the term critical mass?
47. Discuss the advantages and disadvantages of nuclear power compared to the use of fossil fuel generated power.
48. What factors make a fusion reaction difficult to achieve?
49. Discuss the advantages and disadvantages of fusion power from the point of safety, pollution and resources.
50. What do you understand by “background radiation”? State two sources of this radiation.
51. If you swallowed a  $\beta$ -source, which would be the more dangerous to you? Explain why?
52. Which radiation dose would deposit more energy to your body (a) 10 mGy to your hand, or (b) 1mGy dose to your entire body.
53. What is a radioactive tracer? Describe one application each in medicine, agriculture and industry.
54. How can radioactivity help in the treatment of cancer?

### **Long Questions**

1. Write a note on mass spectrograph in detail?
2. Write a note on Wilson cloud Chamber?
3. Write a note on Geiger Muller Counter?
4. Write a note on Solid state detector?
5. Discuss fission and fusion reactions in detail?