

## Section-A

## Multiple Choice Questions (MCQ's)

Q.1: Choose the correct answer for each from the given options:

- (i) If the coefficient of linear expansion of a solid is 0.0009, its co-efficient of volume expansion is:  
 (a) 0.00003 (b) 0.00009 (c) 0.00018 (d) 0.0027
- (ii) Absolute zero on Fahrenheit scale is equal to:  
 (a) 523oF (b) -273oF (c) -460oF (d) -401oF
- (iii) The resistance of a wire is R ohm. If the wire is stretched to double its length, its resistance becomes:  
 (a) 2R (b) R/2 (c) R/4 (d) 4R
- (iv) Direction of electric field intensity is always \_\_\_\_\_ to the electric field lines at every point.  
 (a) Parallel (b) Tangent (c) Perpendicular (d) None of these
- (v) Two capacitors of capacitance 2C and C respectively are connected in series, their equivalent capacitance becomes:  
 (a) 2C (b) C/2 (c) 2C/3 (d) 3C/2
- (vi) Resistance of a substance can be expected to increase for all of the following situation except:  
 (a) Increase in cross-sectional area (b) Increase in length  
 (c) Increase in temperature (d) Increase in resistivity of the material
- (vii) Electron volt is a unit of:  
 (a) Work (b) Frequency (c) Potential difference (d) Energy
- (viii) Isobaric changes in a gas show that there is not change in:  
 (i) Internal energy (b) Pressure (c) Volume (d) Temperature
- (ix) Two parallel wires carrying current in same directions:  
 (a) Repel each other (b) Attract each other  
 (c) Neither attract nor repel (d) Cancel each other's field

- (x) A positron is anti particle of:  
 (a) Photon (b) Electron (c) Proton (d) Neutron
- (xi) When the temperature of source and sink of a heat engine becomes equal, the entropy of the system becomes:  
 (a) Zero (b) Same (c) Minimum (d) Maximum
- (xii) When the forward bias is applied to a p-n junction the concentration of electrons on p side:  
 (a) Increase slightly (b) Increases dramatically  
 (c) Decrease slightly (d) Decreases dramatically
- (xiii) An apparatus used to compare the emf of two cells is:  
 (a) Volt meter (b) Avo meter (c) Galvanometer  
 (d) Potentiometer
- (xiv) 1 atomic mass unit (a.m.u) in terms of energy is nearly equal to:  
 (a) 931 MeV (b) 931KeV (c) 139 MeV (d) 193 KeV
- (xv) Which one of the following is NOT needed in a nuclear fission reaction?  
 (a) Moderator (b) Fuel (c) Coolant (d) Accelerator
- (xvi) Bulk of the mass of an atom is concentrated in its:  
 (a) Electron shells (b) Nucleus (c) Protons (d) Neutrons
- (xvii) Which of the following is one of the functions performed by a diode?  
 (a) Amplifier (b) Filter (c) Rectifier (d) Inverter

## Section-B

## (Short Answer)

Note: Answer any EIGHT of the following questions. Each question carries 05 marks

- Q.2: Calculate the speed of an electron, if it possesses 60 eV energy.
- Q.3: Define co-efficient of linear and volume expansion. Show that co-efficient of linear expansion of the material of a substance is one third of the co-efficient of volume expansion.
- Q.4: Why heat is produced in a conductor when electric current flows through it?
- Q.5: Describe mutual induction with the help of the diagram and define henry.
- Q.6: Write any Five applications of LASER.
- Q.7: What will be the energy of an X-ray photon of wave length  $2.0 \times 10^{-16} \text{m}$ .
- Q.8: Why the rest mass of a photon is zero? Explain.
- Q.9: If an electron and a proton have the same De-Broglie wave length, which particle has greater speed?
- Q.10: Find the speed at which the mass of a proton is twice of its rest mass?
- Q.11: Both potential difference and electromotive force are measured in volt. Are they same? Explain.
- Q.12: Write five properties of good coolant used in nuclear reactor.
- Q.13: A wire carries an electric current of one ampere. How many electrons pass through

the wire in one second?

**Section-C**  
**(Descriptive Answer)**

**Note:** Answer any TWO of the following questions. Each question carries 14(7+7) marks.

Q.14(a): Why a gas has two specific heats? show that molar specific heat of a gas at constant pressure is equal to sum of its specific heat at constant volume and molar gas constant.

(b) Explain photoelectric effect on quantum theory and show that no photoelectron can be ejected from a metal surface, if frequency of the incident light is less than its critical value.

Q.15(a): Derive an expression for the force experienced by a current carrying conductor placed in a uniform magnetic field.

(b) What are the basic postulates of Bohr's atomic theory? Derive an expression for energy of the electron in  $n$ th orbit of a hydrogen atom?

Q16(a): Write notes on any TWO of the following:

- (i) Parallel Plate Capacitor
- (ii) Potentiometer
- (iii) Radioactivity and Half life
- (iv) Power dissipation through a resistor

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