



OBJECTIVE

NOTE:



You have four choices for each objective type question as A , B , C and D . The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero marks in that question.

QUESTION NO. 1

DAK-1-24

- 1 A particle of mass m and charge q is released from rest in a uniform electric field E . The K.E attained by the particle after moving a distance ' d ' is
(A) $\frac{Ed}{q}$ (B) qE^2d (C) qEd (D) $\frac{qE}{d^2}$
- 2 Two charges are placed at a certain distance apart in vacuum. If a dielectric slab is placed between them, the force between them
(A) Will increase (B) Will decrease (C) Will remain unchanged (D) May increase or decrease depending on the material of the slab
- 3 If the current passing through a conductor is reduced to half, then heat produced becomes
(A) 2 times (B) Remains the same (C) $\frac{1}{4}$ times (D) Becomes half
- 4 Weber ampere per meter is equal to
(A) Joule (B) Newton (C) Tesla (D) Henry
- 5 An electron is moving in a circle of radius ' r ' in a uniform magnetic field B suddenly the field is reduced to $\frac{B}{2}$. The radius of circle now becomes
(A) $r/2$ (B) $r/4$ (C) $2r$ (D) $4/r$
- 6 Which of the following quantity remains unchanged in a transformer?
(A) Voltage (B) Current (C) Power (D) Frequency
- 7 Maximum motional emf in a conductor is given by ' vBL '. At which angle the conductor moves in magnetic field such that emf in it becomes half then its maximum value
(A) 0° (B) 30° (C) 45° (D) 60°
- 8 In R-L-C series circuit the phase angle between X_L and X_C is
(A) $\tan^{-1}\left(\frac{WL}{R}\right)$ (B) $\tan^{-1}\frac{1}{wRC}$ (C) $\tan^{-1}\left(\frac{Z}{R}\right)$ (D) π
- 9 The power factor of an A.C circuit has
(A) SI unit ampere (B) SI unit volt (C) SI unit watt (D) Zero
- 10 Curie temperature for iron is about
(A) 750 K (B) 570 K (C) 1023 K (D) 378 K
- 11 The value of input resistance of op-amp is of the order of
(A) Few Ohms (B) Milli Ohms (C) Kilo Ohms (D) Mega Ohms
- 12 A device which converts a physical quantity into voltage is called a
(A) Sensor (B) Inverter (C) Amplifier (D) Photodiode
- 13 We can never accurately describe all aspects of subatomic particles simultaneously. It is correct according to
(A) Uncertainty principle (B) de-Broglie theory (C) Einstein theory (D) Photoelectric effect
- 14 If one photon is obtained in annihilation of matter then which of the following conservation law not hold
(A) Energy (B) Momentum (C) Charge (D) All these law would not hold
- 15 In the Bohr's model of the hydrogen atom, the lowest orbit corresponds to
(A) Infinite energy (B) Maximum energy (C) Minimum energy (D) Zero energy
- 16 Mass equivalent of 931 Mev energy is
(A) 6.02×10^{-31} Kg (B) 1.66×10^{-27} Kg (C) 1.67×10^{-27} Kg (D) 6.02×10^{-27} Kg
- 17 If energy of γ -radiation is less than 0.5 Mev the dominant process is
(A) Photoelectric effect (B) Compton effect (C) Pair production (D) Black body radiation





SECTION - I

QUESTION NO. 2 Write short answers any Eight (8) of the following *DGK-1-24*

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- i What is the effect of medium between the charges on Coulomb's force ? Explain
- ii Describe four properties of electric field lines.
- iii Electric lines of force never cross. Why ?
- iv Do electrons tend to go to region of high potential or of low potential ?
- v Define magnetic flux and magnetic flux density.
- vi Define right hand rule for the determination of direction of magnetic field of current carrying wire.
- vii How can a current loop be used to determine the presence of magnetic field in a given region of space ?
- viii How can you use a magnetic field to separate isotopes of chemical element ?
- ix For what purpose bromine is mixed in principal gas in Geiger tube ?
- x Write down two advantages of solid state detector.
- xi What do we mean by the term critical mass ?
- xii A particle which produces more ionization is less penetrating. Why ?

QUESTION NO. 3 Write short answers any Eight (8) of the following

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- i What is Wheatstone bridge ? How it can be used to determine unknown resistance ?
- ii What are the difficulties in testing whether the filament of a lighted bulb obeys Ohm's law ?
- iii Give some application of thermistor ?
- iv Explain the conditions under which electromagnetic waves are produced from the source ?
- v How the reception of a particular radio station is selected on your radio set ?
- vi What is choke ? Give its uses.
- vii Discuss the mechanism of electrical conduction by Holes and electrons in a pure semiconductor element.
- viii Differentiate between intrinsic and extrinsic semiconductor.
- ix What are crystalline and polymeric solids.
- x Why is the base current in a transistor is very small ?
- xi Why charge carrier are not present in the depletion region ?
- xii How reverse biasing of semiconductor diode occurs ? Show by diagram.

QUESTION NO. 4 Write short answers any Six (6) of the following

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- i Four unmarked wires emerge from a transformer. What steps would you take to determine the turns ratio ?
- ii Can an electric motor be used to drive an electric generator with the output from the generator being used to operate the motor ?
- iii Find the energy stored in an inductor of inductance 100 mH carrying a current of 2 A.
- iv Which has the lower energy quanta ? Radiowaves or x-rays
- v Is it possible to create a single electron from energy ? Explain.
- vi State uncertainty principle in terms of position and momentum of a particle. Also write its mathematical expression.
- vii Write down the postulates of special theory of relativity.
- viii Is energy conserved when an atom emits a photon of light ?
- ix Find the speed of an electron in the first Bohr orbit.

SECTION-II

Note: Attempt any Three questions from this section (Part A = 5 Marks & Part B = 3 Marks 8 x 3 = 24)

Q.5.(A)	What is Electromotive force ? Derive the relation of terminal potential difference.
(B)	In Bohr's atomic model of Hydrogen atom, the electron is in an orbit around the nuclear proton at a distance of 5.29×10^{-11} m with a speed of 2.18×10^6 ms ⁻¹ . Find the electric potential that a proton exerts at this distance.
Q.6.(A)	State Ampere's law. Calculate the magnetic field due to current carrying solenoid.
(B)	A solenoid has 250 turns and its self inductance is 2.4 mH. What is the flux through each turn when the current is 2 A ? What is the induced emf when the current changes at 20 As ⁻¹ ?
Q.7.(A)	Prove that the closed loop gain of OP - AMP as inverting amplifier is given by $G = -\frac{R_2}{R_1}$
(B)	An iron core coil of 2.0 H and 50 Ω is placed in series with a resistance of 450 Ω . An A.C supply of 100V, 50 Hz is connected across the circuit. Find the current flowing in the coil.
Q.8.(A)	Define magnetic hysteresis. Write a note on hysteresis loop, its main features and its applications.
(B)	What is the mass of a 70 kg man in a space rocket traveling at 0.8 c from us as measured from earth
Q.9.(A)	How does uncertainty principle explain that electrons cannot exist inside the nucleus ?
(B)	The half life of $^{91}_{38}\text{Sr}$ is 9.70 hours. Find its decay constant.

