Physics (Subjective)   **Group (II)**   (Session 2015-17 & 2016-18)   **Paper (II)**

Time Allowed: 2.40 hours   **Section ----------------- I**   (Inter Part - II)   Maximum Marks: 68

2.   **Answer briefly any Eight parts from the followings:-**   **8 × 2 = 16**

(i)   Electric lines of force never cross. Why?   (ii) Show that the unit of time constant RC is second .

(iii)   What is the electric intensity at a distance 'r' 100 cm due to charge $10 \mu c$?

(iv)   What is the effect of Polarization on the capacitance of capacitor?

(v)   Suppose that a charge 'q' is moving in a uniform magnetic field with velocity 'v'. Why is there no work done by the magnetic force that acts on the charge q ?

(vi)   If a charged particle moves in a straight line through some region of space, can you say that magnetic field in the region is zero?

(vii)   How can you use a magnetic field to separate isotopes of chemical element?

(viii)   What is the senstivity factor of Galvanometer?

(ix)   How would you position a flat loop of wire in a changing magnetic field so that there is no emf induced in the loop?

(x)   Is it possible to change both area of the loop and the magnetic field passing through the loop and still not have an induced emf in the loop?

(xi)   Can an electric motor be used to drive an electric generator with the output from the generator being used to operate the motor?

(xii)   Does the induced emf always act to decrease the magnetic flux through a circuit?

3.   **Answer briefly any Eight parts from the followings:-**   **8 × 2 = 16**

(i)   Differentiate between resistance and resistivity, give their units.

(ii)   Why does the resistance of a conductor rise with temperature.

(iii)   Describe a circuit which will give a continuously varying potential.

(iv)   Define impedance and resonant frequency, Also write their formula.

(v)   How the reception of a particular radio station is selected on your radio set.

(vi)   How does doubling the frequency affect the reactance of (a) an inductor (b) a capacitor

(vii)   Define saturation and Remanence of Hysteresis loop.   (viii) Define stress and strain what are their S.I units.

(ix)   What is the difference between intrinsic and extrinsic Semiconductor.

(x)   Define rectification. Draw a circuit diagram of half wave rectifier.

(xi)   What do you know about Light emitting diode.   (xii) Why charge carriers are not present in the depletion region?

4.   **Answer briefly any Six parts from the followings:-**   **6 × 2 = 12**

(i)   When does light behave as a wave? When does it behave as a particle.

(ii)   Can pair production take place in vaccum? Explain.

(iii)   Define Special Theory of Relativity and general theory of relativity.

(iv)   Is energy conserved when an atom emits a photon of light?   (v) Define Holography and Population inversion.

(vi)   What factors make a fusion reaction difficult to achieve?   (vii) Why are heavy nuclei unstable.?

(viii)   What do we mean the term critical mass?   (ix) Define Leptons and Hadrons.

Note: Attempt any three questions.   **Section ------------ II**   **(8 × 3 = 24)**

5.   (a)   What is wheatstone bridge? Describe its construction and working. How can it be used to find the unknown resistance of a wire?

   (b)   Determine the electric field at the position $\vec{r} = (4\hat{i} + 3\hat{j}) m$ caused by a point charge $q = 5.0 \times 10^{-6} C$ placed at origin.

6.   (a)   What is a galvanometer? How it is converted into ammeter and voltmeter.

   (b)   A circular coil has 15 turns of radius 2 cm each. The plane of coil lies at $40°$ to a uniform magnetic field of 0.2 T. If the field is increased by 0.5 T in 0.2 s. Find the magnitude of induced emf.

7.   (a)   What is operational amplifier? How op-Amplifier is used as an inverting amplifier?

   (b)   Find the value of current flowing through a capacitance $0.5 \mu F$ when connected to a source of 150 V at 50 Hz.

8.   (a)   What do you meant by wave nature of particles? Explain how it was proved for electrons by Davisson and Germer experiment.

   (b)   A wire 2.5 m long and cross-sectional area $10^{-5} m^2$ is stretched by 1.5 mm by a force of 100 N in the elastic region. Calculate (i) Young's Modulus (ii) The energy stored in the wire.

9.   (a)   What is LASER? Discuss the working of laser by explaining the stimulated emission of radiation and population inversion.

   (b)   A 75 kg person receives a whole body radiation dose of 24 m-rad, delivered by α – particles for which RBE factor is 12. calculate (i) The absorbed dose energy in joules, and   (ii) The equivalent dose in rem.

1218 Warning:- Please write your Roll No. in the space provided and sign.   Roll No------------------
(Inter Part – II)   (Session 2015-17 & 2016-18)   Sig. of Student ----------------
Physics   (Objective)   (Group I)   Paper (II)
Time Allowed:- 20 minutes   **PAPER CODE 4477**   Maximum Marks:- 17
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 mark in that question. Write **PAPER CODE**, which is printed on this question paper, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.
Q. 1

1) The reverse current through a semi conductor diode is due to
   (A) Minority carriers (B) Majority carriers   (C) Holes   (D) Electrons

2) Amount of energy released due to complete conversion of 1 Kg mass into energy is
   (A) $9 \times 10^{16} J$ (B) $9 \times 10^{9} J$ (C) $9 \times 10^{20} J$ (D) $3 \times 10^{8} J$

3) The momentum of photon of frequency 'f' is
   (A) hc / f   (B) hf / c   (C) f / hc   (D) c / hf

4) An A.C. voltmeter reads 220 V, its peak value will be
   (A) 255 V   (B) 311.12 V   (C) 300 V   (D) 200 V

5) In an electronic transition atom cannot emit
   (A) Infrared radiation   (B) Ultra violet radiation   (C) $\gamma - ray$ (D) Visible light

6) The number of neutron present in a nucleus is given by
   (A) N = A + Z   (B) N = A – Z   (C) N = Z – A   (D) N = A × Z

7) The amount of energy equivalent to 1 a.m.u. is
   (A) 9.315 MeV   (B) 93.15 MeV   (C) 931.00 MeV   (D) 0.931 MeV

8) If electric and gravitational forces on an electron balance each other, then electric intensity will be
   (A) $E = \dfrac{mg}{q}$ (B) $E = \dfrac{q}{mg}$ (C) $E = \dfrac{F_e}{q}$ (D) $E = \dfrac{1}{4\pi \in_o} \dfrac{q}{r^2}$

9) A charge of 4 Coulomb is in the field of intensity 4 N/C. The force on the charge is
   (A) 8 N   (B) 16 N   (C) 4 N   (D) 1 N

10) The reciprocal of resistance is called
    (A) Reactance   (B) Inductance   (C) Conductance   (D) Conductivity

11) The force on current carrying conductor placed in magnetic field is expressed by
    (A) $\vec{F} = I\vec{L}\cdot\vec{B}$ (B) $\vec{F} = I\vec{L}\times\vec{B}$ (C) $\vec{F} = I^2\vec{L}\times\vec{B}$ (D) $\vec{F} = I\vec{B}\times\vec{L}$

12) Two parallel wires carrying currents in opposite direction
    (A) Repel each other   (B) Attract each other   (C) Neither attract nor repel each other   (D) Stick to each other

13) Lenz's law is in accordance with the law of conservation of
    (A) Momentum   (B) Angular Momentum   (C) Charge   (D) Energy

14) Which of the following converts electrical energy into mechanical energy?
    (A) Transformer   (B) Motor   (C) D.C. generator   (D) A.C. generator

15) S.I. unit of reactance is
    (A) Farad   (B) Volt   (C) Ampere   (D) Ohm

16) If stress is increased beyond the elastic limit of material, it becomes permanently changed, this behaviour of material is called
    (A) Elasticity   (B) Plasticity   (C) Yield Strength   (D) Ultimate tensile Strength

17) The potential barrier for silicon is
    (A) 0.3 V   (B) 0.7 V   (C) 1.0 V   (D) 0.1 V

Physics (Subjective) Group (I) (Session 2015-17 & 2016-18) (Inter Part - II) **Paper (II)**
Time Allowed: 2.40 hours   Section ----------------- I   Maximum Marks: 68

2.   **Answer briefly any Eight parts from the followings:-** $8 \times 2 = 16$
(i)   Distinguish between electric field and electric field intensity.
(ii) Prove that unit of series RC circuit is second.
(iii) Suppose that you follow an electric field line due to a positive point charge. Do electric field and the potential increase or decrease.   **(iv)** Define dielectric constant and write its formula.
(v)   What is the function of grid In cathode ray oscilloscope.   **(vi)** How can a galvanometer be made more sensitive.
(vii) How can you use a magnetic field to separate isotopes of chemical element.
(viii) Why the voltmeter should have a very high resistance?
(ix) Four unmarked wires emerge from a transformer. What steps would you take to determine the turns ratio?
(x)   Does the induced emf always act to decrease the magnetic flux through a circuit.
(xi) Define mutual induction, write its S.I unit.   **(xii)** Distinguish between A.C generator and transformer.

3.   **Answer briefly any Eight parts from the followings:-** $8 \times 2 = 16$
(i)   Define Ohmic and non ohmic devices.   **(ii)** Do bends in a wire affect its electrical resistance? Explain.
(iii) Describe a circuit which will give a continuously varying potential.
(iv) Name the device that will (c) permit flow of direct current but oppose the flow of alternating current.
(v)   A sinusodial current has rms value of 10A. What is the maximum or peak value?
(vi) Define Alternating current and Choke.   **(vii)** Distinguish between intrinsic and extrinsic semiconductors.
(viii) What is meant by Dia and Ferromagnetic substances? Give example for each.
(ix) Define stress and strain.   **(x)** Why ordinary silicon diodes do not emit light?
(xi) What is AND Gate.   **(xii)** Define Forward Bias and Reversed Bias.

4.   **Answer briefly any Six parts from the followings:-** $6 \times 2 = 12$
(i)   If electron and a proton have same de-Broglie wavelength, which particle has greater speed?
(ii) Will bright light eject more electrons from metal surface than dimmer light of the same colour? Explain.
(iii) Differentiate between special theory of relativity and general theory of relativity.
(iv) Explain why Laser action can not occur without population inversion between atomic level?
(v)   What is a CAT Scanner?   **(vi)** What is mass defect?
(vii) A particle which produces more ionization is less penetrating why?
(viii) What information is revealed by the length and shape of the tracks of an incident particle in Wilson cloud chamber?   **(ix)** Write the names of any four basic forces of Nature.

Note: Attempt any three questions.   Section ------------- II $(8 \times 3 = 24)$

5.   (a)   Derive an expression for energy stored in an inductor in terms of magnetic field.
     (b)   A power line 10 m high carries a current 200 A. Find the magnetic field of the wire at the ground.
6.   (a)   What are the biasing requirements of the junctions of a transistor for its normal operation? Explain how these requirements are met in a common emitter amplifier. By drawing its circuit diagram calculate its gain.
     (b)   A 10 mH, 20Ω coil is connected across 240 V and $180/\pi$ Hz source. How much power does it dissipate?
7.   (a)   Define strain energy. How can you explain the strain energy in deformed materials? Also derive relation for strain energy.
     (b)   A 50 keV photon is Compton scattered by a quasi-free electron. If the scattered photon comes off at $45°$, what is its wavelength.
8.   (a)   What are X – rays ? How are they produced.
     (b)   A sheet of lead 5 mm thick reduces the intensity of a beam of γ – rays by a factor 0.4. Find half value thickness of lead sheet which will reduce the intensity half of its initial value.
9.   (a)   How energy is stored in a capacitor? Derive relations for energy and energy density.
     (b)   Find the current which flows in all the resistances of circuit shown below.
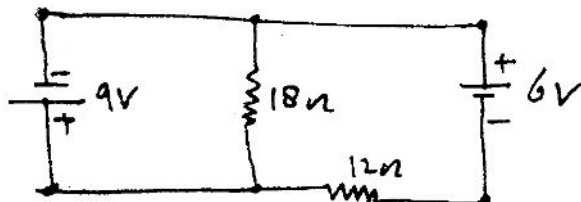
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5. (a) What is potentiometer? How can it be used as
   i) Potential divider
   ii) Measuring of emf of a cell.

   (b) Two point charges $q_1 = -1.0 \times 10^{-6}$ C and $q_2 = 4.0 \times 10^{-6}$ C are separated by a distance of 3.0 m. Find and justify the zero-field location.

6. (a) What is A.C. generator? Give its principle, construction and working of A.C. generator.

   (b) A power line 10 m high carries a current of 200 A. Find the magnetic field of wire at the ground.

7. (a) Explain the RLC series resonance circuit. Determine the value of resonant frequency and write down its properties.

   (b) The current flowing into the base of transistor is 100 μA. Find its collector current I_C. Its emitter current I_E and the ratio $\frac{I_C}{I_E}$, if the value of current gain β is 100.

8. (a) What is meant by strain energy? Draw force extension graph for a vertically suspended wire stretched by a variable weight at the other end and by its graph derive a relation to calculate its value.

   (b) An electron accelerated through a potential difference of 50 V. Calculate its de Broglie wavelength.

9. (a) What is nuclear reactor? Describe its principle, construction and working.

   (b) Compute the shortest wavelength of radiation in the Balmer series. What value of 'n' must be used?