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:- $8 \times 2 = 16$

(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:- $8 \times 2 = 16$

(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:- $6 \times 2 = 12$

(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   ($8 \times 3 = 24$)

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 μF 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.