

Roll No. _____ (To be filled in by the candidate)

(For all sessions)

Physics (Essay Type)

Time: 2:40 Hours

Section - I

Marks: 68

2- Write short answers of any eight parts from the following.**2 x 8 =16**

- i. Show that Σ and $\frac{\Delta\phi}{\Delta t}$ have the same units.
- ii. What is the effect of current passing through a long straight wire?
- iii. Electric lines of force never cross. Why?
- iv. What is motional emf? State the factors it depends upon.
- v. What is the back emf effect in motors?
- vi. Why the resistance of ammeter should be very low?
- vii. Why does the picture on T.V screen become distorted when a magnet is brought near the screen?
- viii. Write down the factors upon which the force on current carrying conductor placed in uniform magnetic field depends.
- ix. What is Coulomb's law and effect of dielectric on Coulomb's force?
- x. State Gauss's law and its mathematical expression.
- xi. Is $\vec{E}$ necessarily zero inside a charged rubber balloon if balloon is spherical? Assume that charge is distributed uniformly over the surface.
- xii. Does the induced emf in a circuit depend on the resistance of the circuit? Does induced current depend on the resistance of the circuit?

3- Write short answers of any eight parts from the following.**2 x 8 =16**

- i. What are difficulties in testing whether the filament of a lighted bulb obey's ohm's law?
- ii. How heating effect produced when current flow through the conductor?
- iii. What is Thermister? Give its two applications.
- iv. What is Choke? Why is it used in A.C circuit?
- v. At what frequency will an inductor of 1.0H have a reactance of 500Ω ?
- vi. How many times per second will an incandescent lamp reach maximum brilliances when connected to a 50Hz source?
- vii. What are ductile and brittle substances? Give an example of each.
- ix. What is meant by hysteresis loss? How is it used in the construction of a transformer?
- viii. What is meant by Dia and Feromagnetic substances? Give an example for each.
- xi. Write four applications of photo diode.
- xii. Draw the symbol and truth table of NOR gate.
- x. Why a photo diode is operated in reverse biased state?

4- Write short answers of any six parts from the following.**2 x 6 =12**

- i. What advantages an electron microscope has over an optical microscope?
- ii. Why do we not observe compton effect with visible light?
- iii. Define positron and Heisenberg uncertainty principle.
- iv. What do we mean when we say that atom is excited?
- v. What are the advantages of laser over ordinary light?
- vi. How can radioactivity help in the treatment of cancer?
- vii. What factors make a fusion reaction difficult to achieve?
- viii. What do you mean by the terms critical mass?
- ix. Define Hadrons and Leptons.

Section - II**NOTE: Answer any three questions from the following.****8x3=24**

5. (a) Define a capacitor and capacitance. Derive an expression for capacitance of a parallel plate capacitor when a dielectric material is inserted between the plates. **05**
- (b) The resistance of an iron wire at 0°C is $1 \times 10^4 \Omega$. What is the resistance at 500°C , if the temperature co-efficient of resistance of iron is $5.2 \times 10^{-3} \text{K}^{-1}$? **03**
6. (a) What do you mean by the galvanometer? Write down the principle, construction and working of galvanometer. **05**
- (b) A square coil of side 16cm has 200 turns and rotates in a uniform magnetic field of magnitude 0.05T. If the peak emf is 12V. What is angular velocity of the coil? **03**
7. (a) What is RC series circuit? Calculate the impedance and phase angle for RC series circuit. **05**
- (b) The current flowing into the base of transistor is $100 \mu\text{A}$. Find its collector current I_c and emitter current I_e if the value of current gain β is 100. **03**
8. (a) What is meant by photo electric effect? Explain it with reference to : (i). Intensity of light. (ii). Frequency of light: Also write and discuss its Important results. **05**
- (b) What stress would cause a wire into increase in length of 0.01%. If Young's modulus of the wire is $12 \times 10^{10} \text{Pa}$? What force would produce this stress If the diameter of the wire is 0.56mm? **05**
9. (a) Describe the principle, construction and working of Wilson's cloud chamber. How it provide information about charged particle? **05**
- (b) Calculate the longest wavelength of radiation for the Paschen Series. **03**