MODEL PAPER- MARCH -2016
II P.U.C PHYSICS (33)

Time : 3 hrs 15 min. **Max Marks : 70**

General instructions:

a) *All parts are compulsory.*
b) *Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.*
c) *Direct answers to the Numerical problems without detailed solutions will not carry any marks.*

PART - A

I. *Answer ALL of the following* **10 x 1 = 10**

1. Charges of 10 μC and 15 μC are separated by a certain distance. Which charge repels the other with a greater force?
2. How does the mobility of a charged particle vary with its mass?
3. Susceptibility of a magnetic material is -1.66×10^{-5}. Name the type of magnetic material.
4. Why is the core material of a transformer laminated?
5. Mention the need for displacement current.
6. Name the lens used to rectify myopia.
7. What happens to the interference fringes when the distance between the two coherent sources is decreased?
8. In proton – proton cycle, what is the approximate energy released?
9. Name the operating region of a transistor for the use of transistor as an amplifier.
10. What is a repeater in a communication system?

PART - B

II. *Answer FIVE of the following* **5×2 = 10**

11. Define electric flux through an area element. Mention the SI unit of electric flux.
12. Plot a graph showing the variation of resistivity of copper with temperature.
13. Define (i) Magnetic declination and (ii) Horizontal component of earth's magnetic field.
14. State Faraday's law and Lenz's law of electromagnetic induction.
15. State Huygen's principle.
16. Give an example for alpha decay and write the range of Q-value for alpha decay.
17. What is an integrated circuit (IC)? Mention the most widely used technology in the fabrication of IC.
18. Draw a neat labeled block diagram of an AM transmitter.

PART - C

III *Answer FIVE of the following* 5×3 = 15

19. Obtain an expression for potential energy of a system of two charges in free space in the absence of an external electric field.
20. What is a toroid?Write the expression for magnetic field at a point well inside a toroid and explain the terms.
21. Obtain an expression for the time-period of oscillations of small compass needle in a uniform magnetic field.
22. Deduce the expression for energy stored in an inductor of self inductance L to build up a current I.
23. What is a phasor? What is the phase difference between current and voltage in a purely capacitive ac circuit? Show the phase difference through a phasor diagram.
24. Write the Cartesian sign convention used in spherical mirrors.
25. Write three characteristics of nuclear forces.
26. Explain with the help of a circuit diagram, how the thickness of depletion layer in a p-n junction diode changes when it is forward biased?

PART - D

IV *Answer TWO of the following* 2×5 = 10

27. State Gauss law in electrostatics and obtain an expression for electric field at a point due to an infinitely long straight uniformly charged thin wire.
28. Derive the expression for equivalent emf and equivalent internal resistance of two cells connected in series.
29. Obtain the expression for magnetic field at a point on the axis of a circular loop carrying current.

V *Answer TWO of the following* 2×5 = 10

30. In Young's double slit experiment, deduce the conditions for constructive and destructive interference at a point on the screen.
31. Deduce the expression for total energy of electron in the n^{th} stationary orbit of hydrogen atom.
32. With a neat circuit diagram, explain the working of a transistor as a switch.

VI *Answer THREE of the following* 3×5 = 15

33. A capacitor of capacitance 5 μF is charged to potential of 500V. Then it is disconnected from the battery and connected to uncharged capacitor of capacitance 3 μF.. Calculate the common potential, charge on each capacitor and the loss of energy.

34. A uniform copper wire of length 2m and cross-sectional area $5\times10^{-7}\ m^2$ carries a current of 2A. Assuming that there are $8x10^{28}$ free electrons per m^3 of copper, calculate the drift velocity of electrons. How much time will an electron take to drift from one end of the wire to the other? (Given charge on an electron e = 1.6×10^{-19}C)

35. A resistance of 600 Ω, an inductor of 0.4 H and a capacitor of 0.01 μF are connected in series to an AC source of variable frequency. Find the frequency of AC source for which current in the circuit is maximum. Also calculate the band width and quality factor for the circuit.

36. A convex lens of focal length 0.24 m and of refractive index 1.5 is completely immersed in water of refractive index 1.33. Find the change in focal length of the lens.

37. Ultraviolet light of wavelength 2271 Å from a 100 W mercury source irradiates a photocell made of molybdenum metal. If the stopping potential is 1.3 V, estimate the work function of the metal. How would the photocell respond to a high intensity red light of wavelength 6328 Å produced by a He-Ne laser?

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NOTE: *It is only a pattern of Question Paper*