MAYILADUTHURAI DISTRICT REVISION EXAMINATION-2023

12 -PHYSICS

Time – 3 : 00 hours **Total - 70 Marks**

PART – I

15 X 1 = 15

Note : (i) Answer all the questions
(ii) Choose the best answer and write the option code and corresponding answer

1. **If voltage applied on a capacitor is increased from V to $2V$, choose the correct conclusion.**
   (a) Q remains the same, C is doubled (b) Q is doubled, C doubled
   (c) C remains same, Q doubled (d) Both Q and C remain same
2. **Two point charges A and B having charges +Q and -Q respectively are placed at certain distance apart and force acting between them is 'F'. If 25% of charge of A is transformed to B, then the force between the charges becomes**
   (a) $\frac{16}{9}F$ (b) $\frac{9}{16}F$ (c) $\frac{4}{3}F$ (d) F
3. **The temperature coefficient of resistance of a wire is 0.00125 per °C. At 20°C, its resistance is 1 Ω. The resistance of the wire will be 2 Ω at**
   (a) 800 °C (b) 700 °C (c) 850 °C (d) 820 °C
4. **A circular coil of radius 5 cm and 50 turns carries a current of 3 ampere. The magnetic dipole moment of the coil is nearly**
   (a) 1.0 A m² (b) 1.2 A m² (c) 0.5 A m² (d) 0.8 A m²
5. **The reactance offered by 300 mH inductor to and AC supply of frequency 50 Hz is**
   (a) 1046 Ω (b) 9420 Ω (c) 94.2 Ω (d) 104.6 Ω
6. **$\frac{20}{\pi^2}$ H inductor is connected to a capacitor of capacitance C. The value of C in order to impart maximum power at 50 Hz is**
   (a) 50 μF (b) 0.5 μF (c) 500 μF (d) 5 μF
7. **Which of the following is NOT true for electromagnetic waves?.**
   (a) in vacuum, it travels with different speeds which depend on their frequency
   (b) it transports energy
   (c) it transports momentum
   (d) it transports angular momentum
8. **For light incident from air on a slab of refractive index 2, the maximum possible angle of refraction is,**
   (a) 30° (b) 45° (c) 60° (d) 90°
9. **First diffraction minimum due to a single slit of width 1.0×10^{-5} cm is at 30°. Then wavelength of light used is,**
   (a) 400 Å (b) 500 Å (c) 600 Å (d) 700 Å
10. **In an electron microscope, the electrons are accelerated by a voltage of 14 kV. If the voltage is changed to 224 kV, then the de Broglie wavelength associated with the electrons would**
    (a) increase by 2 times (b) decrease by 2 times
    (c) decrease by 4 times (d) increase by 4 times
11. **The half life of radio element is 600 years. The fraction of sample that would remain after 3000 years,**
    (a) $\frac{1}{8}$ (b) $\frac{1}{16}$ (c) $\frac{1}{32}$ (d) $\frac{1}{2}$
12. **The ratio of the wavelengths for the transition from $n=2$ to $n=1$ in Li++, He+ and H is**
    (a) 1 : 2: 3 (b) 1: 4: 9 (c) 3 : 2 : 1 (d) 4: 9: 36
13. **The current gain in CB mode is 0.9 , then the current gain in CE mode is**
    (a) 9 (b) 90 (c) 0.9 (d) 900
14. **If the input to the NOT gate is A = 1011, its output is**
    (a) 0100 (b) 1000 (c) 1100 (d) 0011
15. **Ski wax" is an application of nano product in the field of**
    (a) Medicine (b) Textile (c) Sports (d)Automotive industry

PART - II

6 X 2 = 12

Note : (i) Answer any 6 of the following questions .
(ii) Question No. 19 is compulsory

16. Define electric flux. Give its unit
17. What is Seebeck effect?
18. State Fleming's Left hand rule.
19. A 500 μH inductor, $\frac{80}{\pi^2}$ pF capacitor and a 628 Ω resistor are connected to form a series RLC circuit. Calculate the resonant frequency and Q-factor of this circuit at resonance.
20. What are Fraunhofer lines?
21. Write the applications of X-rays.
22. Define Curie.
23. What do you mean by skip distance?
24. Mention any two advantages and disadvantages of Robotics.

PART – III

6 X 3 = 18

Note : (i) Answer any 6 of the following questions .
(ii) Question No.32 is compulsory

25. Obtain the for energy stored in the parallel plate capacitor.
26. Explain the equivalent resistance of parallel resistor network.
27. Discuss the conversion of galvanometer into a voltmeter.
28. Find out the phase relationship between voltage and current in a AC circuit containing resistor only.
29. What is critical angle and total internal reflection?
30. State and derive Brewster's law.
31. Give the construction and working of photo emissive cell.
32. Show that the mass of radium $(^{226}_{88}Ra)$with an activity of 1 curie is almost a gram. Given $T_{1/2} = 1600\ years$
33. Draw the circuit diagram of half wave rectifier and explain its working.

PART - IV

5 X 5 = 25

Note : (i) Answer all the questions

34. (a) Calculate the electric field due to a dipole on its equatorial plane.

(or)

(b) Obtain the equation for dispersive power of a medium.

35. (a) How the emf of two cells are compared using potentiometer.

(or)

(b) Derive the expression for the radius of n^{th} orbit of the electron using Bohr atom model.

36. (a) Prove the laws of reflection using Huygen's principle.

(or)

(b) (i) Derive an expression for de Broglie wavelength of electron
(ii)An electron is accelerated through a potential difference of $81V$. What is the de Broglie wavelength associated with it? To which part of electromagnetic spectrum does this wavelength correspond?

37. (a) Explain the types of absorption spectrum.

(or)

(b) Describe the function of a transistor as an amplifier with the neat circuit diagram. Sketch the input and output waveforms

38. (a) Using Biot-Savart law, obtain a relation for magnetic field at a point along the axis of a circular coil carrying current.

(or)

(b) Show mathematically that the rotation a a coil in a magnetic field over one rotation includes an alternating emf of one cycle.