TVL12P

Tirunelveli District
Common Half Yearly Examination - December 2023

Standard 12
PHYSICS

Time Allowed: 3.00 Hours Maximum Marks: 70

Part - I

Note: **(i) Answer all the questions.** **15 x 1 = 15**
(ii) Choose the best answer and write the option code and corresponding answer.

1. The materials used in Robotics are
   a) aluminium and silver b) silver and gold
   c) copper and gold d) steel and aluminium
2. The cut-off wavelength of x-rays from an x-ray tube of accelerating potential 20,000V
   a) 0.62 Å b) 1.24 Å c) 0.58 Å d) 62 Å
3. In a series resonant RLC circuit, the voltage across 100 Ω resistor is 40 V. The resonant frequency ω is 250 rad/s. If the value of C is 4μf, then the voltage across L is
   a) 600 V b) 4000 V c) 400 V d) 1 V
4. The frequency range of 3 MHz to 30 MHz is used for
   a) ground wave propagation b) space wave propagation
   c) sky wave propagation d) satellite communication
5. A dipole of dipole moment (E) aligned in the direction of the electric field, the work done in rotating the dipole in the direction opposite to the field is
   a) zero b) pE c) -pE d) 2 pE
6. If the amplitude of the magnetic field is 3×10^{-6} T, then amplitude of the electric field for a electromagnetic waves is
   a) 100 Vm^{-1} b) 300 Vm^{-1} c) 600 Vm^{-1} d) 900 Vm^{-1}
7. Stars twinkle due to,
   a) reflection b) total internal reflection c) refraction d) polarization
8. If the number of turns in a moving coil galvanometer is doubled,
   a) voltage sensitivity is doubled and current sensitivity remain unchanged
   b) both voltage and current are doubled
   c) voltage and current sensitivity remain unchanged
   d) voltage sensitivity remain unchanged and current sensitivity is doubled
9. The heat energy produced in a resistance of 10 Ω when 5 A current flows through it for 5 minutes.
   a) 75 J b) 75 kJ c) 25 J d) 25 kJ
10. The momentum of the electron having wavelength 2Å is
    a) 3.3×10^{24} kg m s^{-1} b) 6.6×10^{24} kg m s^{-1}
    c) 3.3×10^{-24} kg m s^{-1} d) 6.6×10^{-24} kg m s^{-1}
11. In a Wheatstone bridge P = 100 Ω, Q = 1000 Ω and R = 40 Ω. If the galvanometer shows zero deflection, the value of resistance S is
    a) 100 Ω b) 200 Ω c) 300 Ω d) 400 Ω
12. The ratio between the first three orbits of hydrogen atom is
    a) 1 : 2 : 3 b) 2 : 4 : 6 c) 1 : 4 : 9 d) 1 : 3 : 5
13. in LCR series a.c. circuit, the phase difference between current and voltage is 30°. The reactance of the circuit is 17.32 Ω. The value of resistance is
    a) 30 Ω b) 10 Ω c) 17.32 Ω d) 1.732 Ω
14. A radioactive element has N_0 number of nuclei at t = 0. The number of nuclei remaining after half of a half-life (that is, at time $t = \frac{1}{2} T_{1_2}$)
    a) $\frac{N_0}{2}$ b) $\frac{N_0}{\sqrt{2}}$ c) $\frac{N_0}{4}$ d) $\frac{N_0}{8}$

15. Eye defect astigmatism can be corrected by using
a) convex lens b) concave lens c) cylindrical lens d) bifocal lens

Part - II

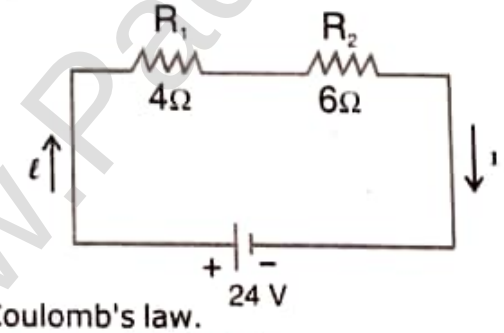
Note: (i) Answer any six of the following questions. **6 x 2 = 12**
(ii) Question Number 20 is compulsory.

16. Define "Electrostatic potential".
17. State Kirchhoff's voltage rule.
18. What is magnetic susceptibility?
19. State lenz's law.
20. The self-inductance of an air-core solenoid is 4.8 mH. If its core is replaced by iron core, then its self-inductance becomes 1.8 H. Find out the relative permeability of iron.
21. Why does sky appear blue?
22. Find the polarising angles for glass of refractive index 1.5.
23. How will you define threshold frequency?
24. Define Impact Parameter.

Part - III

Note: (i) Answer any six of the following questions. **6 x 3 = 18**
(ii) Question Number 32 is compulsory.

25. What is the difference between Nano materials and Bulk materials?
26. State and prove De morgan's first and second theorem.
27. Obtain the law of radioactivity.
28. UV light of wavelength 1800 Å is incident on a lithium surface whose threshold wavelength is 4965 Å. Determine the maximum energy of the electron emitted.
29. State and obtain Malu's law.
30. Write down any six of the properties of electromagnetic waves.
31. Give the properties of dia / para / ferromagnetic materials.
32. Calculate the equivalent resistance for the circuit which is connected to 24 V battery and also find the potential difference across each resistors in the circuit.



33. Obtain Gauss law from Coulomb's law.

Part - IV

Note: Answer all questions. **5 x 5 = 25**

34. a) Describe the Fizeau's method to determine the speed of light. ***(OR)***
b) Calculate the magnetic field inside the long solenoid using Ampere's circuital law.
35. a) Describe briefly Davisson-Germer experiment which demonstrated the wave nature of electrons. ***(OR)***
b) Calculate the electric field due to a dipole on its axial line.
36. a) Draw the circuit diagram of half wave rectifier and explain its working. ***(OR)***
b) Explain the construction and working of transformer.
37. a) Derive the expression for radius of an electron is the hydrogen atom using Bohr atom model. ***(OR)***
b) How the emf of two cells are compared using potentiometer?
38. a) Write down Maxwell equations in integral form. ***(OR)***
b) Discuss about the simple microscope and obtain the equation for magnification for near point focusing and normal focusing.
