Class : 12

Register Number

# COMMON HALF YEARLY EXAMINATION - 2024 - 25

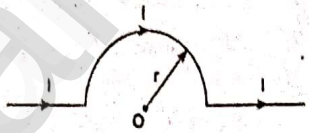
Time Allowed : 3.00 Hours] **PHYSICS** [Max. Marks : 70

**PART-I** 15x1=15

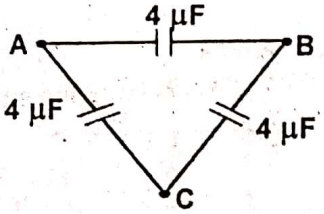
I. **Choose the correct answer.**



1. Which charge configuration produces a uniform electric field?
   a) Point charge b) Uniformly charged infinite line
   c) Uniformly charged spherical shell d) Uniformly changed infinite plane
2. A toaster operating at 240 V has resistance of 120Ω its power.
   a) 240 W b) 480 W c) 2 W d) 400 W
3. In Joule's heating law, When R and T are constant, If the H is taken along the Y - axis and $I^2$ along the x - axis, the graph is
   a) Circle b) Ellipse c) Parabola d) Straight line
4. The magnetic field at the centre O of the following current loup is

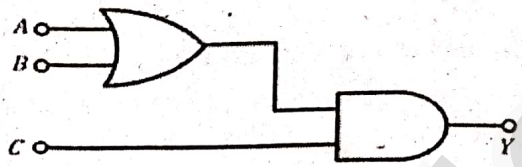



   a) $\frac{\mu_0 I}{4r}\otimes$ b) $\frac{\mu_0 I}{2r}\odot$ c) $\frac{\mu_0 I}{4r}\odot$ d) $\frac{\mu_0 I}{2r}\otimes$
5. The vertical component of Earth's magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place?
   a) 90° b) 60° c) 45° d) 30°
6. Three capacitors are connected in triangle as shown in figure. The equivalent capacitance between the points A and C is




   a) 4 μF b) 2 μF
   c) 8 μF d) 6 μF
7. When the current changes from + 2A to - 2A in 0.05 S, an emf of 8V is induced in a coil. The co - efficient of self induction of the coil is
   a) 0.1 H b) 0.8 H c) 0.4 H d) 0.2 H
8. Which of the following is an Electromagnetic Wave?
   a) α - rays b) β - rays c) γ - rays d) All of them.
9. Stars twinkle due to,
   a) Reflection b) Total internal reflection
   c) Refraction d) Polarisation
10. The wavelength $\lambda_e$ of an electron and $\lambda_p$ of a photon of same energy E are related by
    a) $\lambda_p \propto \frac{1}{\sqrt{\lambda_e}}$ b) $\lambda_p \propto \lambda_e$ c) $\lambda_p \propto \lambda_e^2$ d) $\lambda_p \propto \sqrt{\lambda_e}$
11. First diffraction minimum due is a single slit of width $1.0 \times 10^{-5}$ cm is at 30°. Then wavelength of light used is,
    a) 400A° b) 500A° c) 600A° d) 700A°
12. Emission of electrons by the absorption of heat energy is called ---------- emission.
    a) Photoelectric b) Field c) Thermionic d) Secondary

13. The mass If a $_3Li^7$ nucleus is 0.042 u less than the sum of the masses of all its nucleons. The average binding energy per nucleon of $_3Li^7$ nucleus is nearly.
    a) 46 Mev b) 5.6 Mev c) 3.9 Mev d) 23 Mev
14. If the input to the NOT gate is A = 0101, its output is
    a) 1100 b) 1001 c) 1010 d) 0000
15. The output of the following circuit is O when the input ABC is




    a) 101 b) 110
    c) 011 d) None of the above

## PART - II

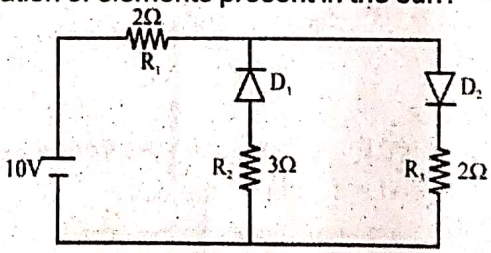
**II. Answer Any Six of The Following. (Answer Question No.24 Compulsory)** **6x2 =12**

16. What is Corona discharge?
17. How will you increase the current sensitivity of a galvanometer.
18. Define Work function of a metal. Mention its unit.
19. Al Calculate the radius of Aluminium nucleus.
20. State Ampere's Circuital law.
21. Why does sky appear blue?
22. Write any two uses of Infrared radiation.
23. What do you mean by Doping?
24. If the focal length is 150 cm for a lens, What is the power of the lens?

## PART- III

**III. Answer Any Six of The Following. (Answer Ques tion No.33 Compulsory)** **6x3=18**

25. Derive an expression for Electrostatic potential due to a point charge.
26. State Kirchhoff's first and second rules.
27. Explain the conversion of Galvanometer into an Ammeter.
28. How will you induce an emf by changing the area enclosed by the coil, Explain it.
29. What are Fraunhofer lines? How are they useful in the identification of elements present in the sun?
30. The given circuit has two identical diodes connected as shown in figure below. Calculate the current flowing through the resistance $R_1$.




31. What is Optical path? Write down the question for optical path and Mention what each term represents.
32. Writ any three laws of Photoelectric effect.
33. Calculate the amount of energy released in Joules when 1 Kg of $_{92}U^{235}$ undergoes fission reaction.

## PART- IV

**IV. Answer ALL Questions.** **5x5 =25**

34. a) Derive an expression for Electrostatic potential due to an electric dipole. **(OR)**
    b) Explain about Compound microscope and Obtain the equation for the magnification.
35. a) Explain the determination of unknown resistance using metre bridge. **(OR)**
    b) (i) Obtain Einstein's Photoelectric equation with necessary explanation.
    (ii) List out the characteristics of Photons.
36. a) Discuss the Working of Cyclotron in detail. **(OR)**
    b) State and Prove De - Morgan's First and Second Theorem.
37. a) What is Absorption Spectrum? Explain the types. **(OR)**
    b) Describe the Fizeau's method to determine the speed of light.
38. a) Discuss the spectral series of Hydrogen atom. **(OR)**
    b) Derive an expression for phase angle between the applied Voltage and Current in a series RLC circuit.