COMMON HALF-YEARLY EXAMINATION - 2019

Reg.No. XI 2 2 1 2

Standard XII

Marks 70

PHYSICS

Time: 3.00 hours.

Instructions : i) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

ii) Use blue or black ink to write and underline and pencil to draw diagrams.

Part - I

15 x 1 = 15

Note : i) Answer all questions.

ii) Choose the correct answer from the four alternatives and write the option code and the corresponding answer.

1. If the velocity and wavelength of light in air is V_a and λ_a and that in water is V_w and λ_w then the refractive index of water is

   a) $\frac{V_w}{V_a}$ b) $\frac{V_a}{V_w}$ c) $\frac{\lambda_w}{\lambda_a}$ d) $\frac{V_a \lambda_a}{V_w \lambda_w}$

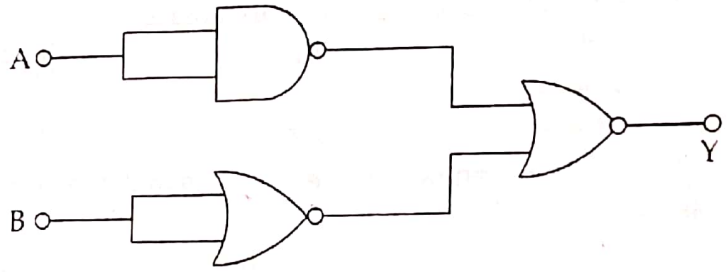
2. The flux linked with a coil at any instant t is given by $\phi_B = 10t^2 - 50t + 250$. The induced emf at t = 3 s is

   a) −190 V b) −10 V c) 10 V d) 190 V

3. If V_g, V_x, V_m are speeds of Gamma rays, X-rays and microwaves respectively in vacuum then

   a) $V_g < V_x < V_m$ b) $V_g > V_x > V_m$ c) $V_m > V_g > V_x$ d) $V_g = V_x = V_m$

4. The given electrical network is equivalent to



   a) AND gate b) OR gate c) NOR gate d) NOT gate

5. Which charge configuration produces a uniform electric field?

   a) point charge b) infinite uniform line charge

   c) uniformly charged infinite plane d) uniformly charged spherical shell

6. In an electron microscope, the electrons are accelerated by a voltage of 25 kV. If the voltage is changed to 225 kV, then the de-Broglie wavelength associated with the electrons would

   a) increase by 3 times b) decrease by 3 times

   c) decrease by 4 times d) increase by 4 times

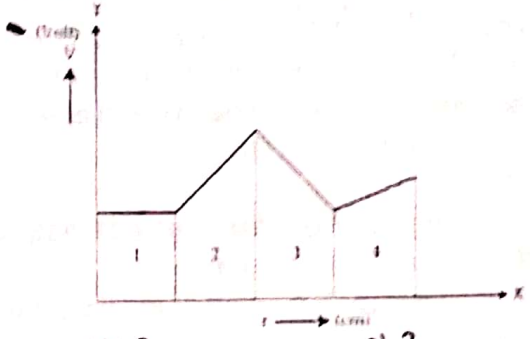
7. In a transformer, the number of turns in the primary and the secondary coil are 300 and 1800 respectively. If the current in primary is 6 A, then that in the secondary coil is

   a) 2 A b) 18 A c) 12 A d) 1 A

8. The magnitude of magnetic moment of an electron orbiting in a circular orbit of radius r with a speed V is equal to

   a) $\frac{eVr}{2}$ b) eVr c) $\frac{er}{2V}$ d) $\frac{2V}{er}$

9. In the graph, potential (V) is plotted as a function of distance (x) from the center. In which part of the region the magnitude of X-component of electric field becomes zero?



a) 1 b) 2 c) 3 d) 4

10. A ray of light gets refracted into the air medium from crown glass of refractive index 1.541. If angle of incidence is equal to the critical angle 40.5°, then the angle of refraction will be
    a) equal to the critical angle b) lesser than the critical angle
    c) equal to 90° d) greater than critical angle
11. An electric bulb is rated 100 W, 230 V. The supply voltage drops to 115 V. What is the heat energy produced by the bulb in 20 min?
    a) 30 kJ b) 40 kJ c) 35 kJ d) 45 kJ
12. 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) 30° b) 45° c) 60° d) 90°
13. The radius of $^{27}_{13}Al$ nucleus is
    a) 6.97 F b) 3.6 F c) 2.4 F d) 4.2 F
14. Calculate the height of the antenna required to transmit the modulated signal of frequency ν = 3 MHz is
    a) 25 m b) 75 m c) 7.5 km d) 2.5 km
15. The primary use of a zener diode is
    a) rectifier b) amplifier
    c) oscillator d) voltage regulator

Part - II

Answer any 6 questions: (Ques.No.24 is compulsory) 6 x 2 = 12

16. Define impact parameter.
17. What are the differences between Coulomb force and Grativational force?
18. Two polaroids are kept with their transmission axes inclined at 30°. Unpolarised light of intensity I falls on the first polaroid. Find out the intensity of light emerging from the second period.
19. What is meant by hysteresis?
20. In a transistor connected in the common base configuration, α = 0.95, I_E = 1 mA. Calculate the values of I_C and I_B.
21. Distinguish between drift velocity and mobility.
22. What is Bandwidth in Communication?

23. What is displacement current?
24. A spherical stone and a spherical metallic ball of same size and mass are dropped from the same height. Which one, a stone or a metal ball, will reach the earth's surface first? Justify your answer. Assume that there is no air friction.

Part - III

Answer any 6 questions: (Ques.No.33 is compulsory) 6 x 3 = 18

25. What are the advantages and limitation of frequency modulation?
26. Calculate the magnetic field at the center of a square loop which carries a current of 1.5 A. Length of each loop is 50 cm.
27. What are photodiodes and mention its application?
28. Derive the relation between f and R for a spherical mirror.
29. Obtain the condition for bridge balance in Wheatstone's bridge.
30. List out the Laws of Photoelectric effect.
31. Half lives of two radioactive elements A and B are 20 minutes and 40 minutes respectively. Initially, the samples have equal number of nuclei. Calculate the ratio of decayed numbers of A and B nuclei after 80 minutes.
32. Show that the total energy is conserved during LC Oscillations.
33. A dipole is formed by two charges of 5 μC and –5 μC at a distance of 8 mm. Find the electric field at
    a) a point 25 cm away from center of dipole along its axial line
    b) a point 20 cm away from center of dipole along its equatorial line

Part - IV

Answer all the questions: 5 x 5 = 25

34. a) Explain the principle, construction and working of cyclotron in detail.

(or)

    b) Derive an expression for electrostatic potential due to an electric dipole and discuss the speical cases.

35. a) Briefly explain the principle and working of electron microscope with a neat diagram.

(or)

    b) What is Snell's Window? Obtain an expression for the radius of illumination.

36. a) Describe the microscopic model of current and obtain general form of Ohm's Law.

(or)

    b) Derive an expression for phase angle between the applied voltage and current in a series RLC circuit.

37. a) Obtain the Law of Radioactive Decay with Graph.

(or)

    b) Draw the circuit diagram of a half wave rectifier and explain its working.

38. a) Explain about compound microscope and obtain the equation for magnification.

(or)

    b) What is spectrum? Explain the types of Emission Spectra.

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