

SIR CV RAMAN COACHING CENTRE , IDAPPADI, SALEM
XLL PHYSICS – UNIT 9 AND 10 , MODEL QUESTION PAPER – 2024
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TOTAL MARK : 50 M,, TIME : 1 HRS

Section – a (5 x 1 = 5 m)

Choose the correct best answer

1. The nucleus is approximately spherical in shape. Then the surface area of nucleus having mass number A varies

- | | |
|---------------|---------------|
| (a) $A^{2/3}$ | (b) $A^{4/3}$ |
| (c) $A^{1/3}$ | (d) $A^{5/3}$ |

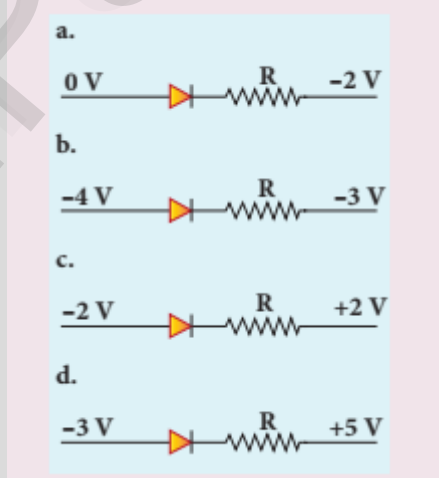
2. A radioactive nucleus (initial mass number A and atomic number Z) emits two α -particles and 2 positrons. The ratio of number of neutrons to that of proton in the final nucleus will be

- | | |
|-------------------------|--------------------------|
| (a) $\frac{A-Z-4}{Z-2}$ | (b) $\frac{A-Z-2}{Z-6}$ |
| (c) $\frac{A-Z-4}{Z-6}$ | (d) $\frac{A-Z-12}{Z-4}$ |

3. The half-life period of a radioactive element A is same as the mean life time of another radioactive element B. Initially both have the same number of atoms. Then

- (a) A and B have the same decay rate initiall (b) A and B decay at the same rate always
 (c) B will decay at faster rate than A (d) A will decay at faster rate than B.

4. Which one of the following represents forward bias diode?



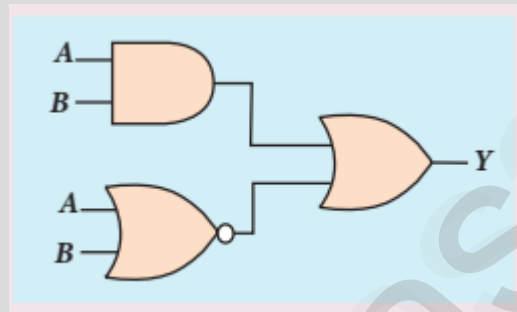
5. The variation of frequency of carrier wave with respect to the amplitude of the modulating signal is called

- a) Amplitude modulation b) Frequency modulation
c) Phase modulation d) Pulse width modulation

section – B (5 x 2 = 10 m)

answer any five questions .compulsory q.no 13.

6. What are cathode rays?
7. What is distance of closest approach?
8. Define atomic mass unit u
9. What is meant by radioactivity?
10. What do you mean by doping?
11. What are logic gates?
12. What is an integrated circuit?
13. Write down Boolean equation for the output Y of the given circuit and give its truth table



Section – c (5 x 3 = 15 m)

answer any five questions .compulsory q.no 17.

14. Give applications of RADAR.
15. Write a note on photodiode.
16. What is meant by satellite communication? Give its applications.
17. Prove the following Boolean expressions using the laws and theorems of Boolean algebra

- i) $(A+B)(A+\bar{B}) = A$
- ii) $A(\bar{A}+B) = AB$
- iii) $(A+B)(A+C) = A+BC$

18. Explain the idea of carbon dating
19. Explain in detail the four fundamental forces in nature
20. Briefly explain the elementary particles present in nature
21. Discuss the gamma emission process with example

Section – C (4 x 5 = 20 m)

Answer any four questions

- 22 a) Describe the working of nuclear reactor with a block diagram
(or)

b) Characol pieces of tree is found from an archeological site. The carbon-14 content of this characol is only 17.5% that of equivalent sample of carbon from a living tree. What is the age of tree?

23 a) Explain the variation of average binding energy with the mass number using graph and discuss about its features.

(or)

b) Keezhadi (கீழடி), a small hamlet, has become one of the very important archeological places of Tamilandu. It is located in Sivagangai district. A lot of artefacts (gold coins, pottery, beads, iron tools, jewellery and charcoal, etc.) have been unearthed in Keezhadi which have given substantial evidence that an ancient urban civilization had thrived on the banks of river Vaigai. To determine the age of those materials, the charcoal of 200 g sent for carbon dating is given in the following figure (b). The activity of $^{14}_6\text{C}$ is found to be 37 decays/s. Calculate the age of charcoal



Figure (a) Keezhadi – excavation site

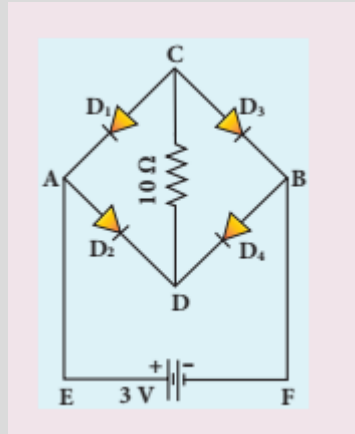


Figure (b) – Characol which was sent for carbon dating

24 a) Explain the ground wave propagation and space wave propagation of electromagnetic waves through space

(or)

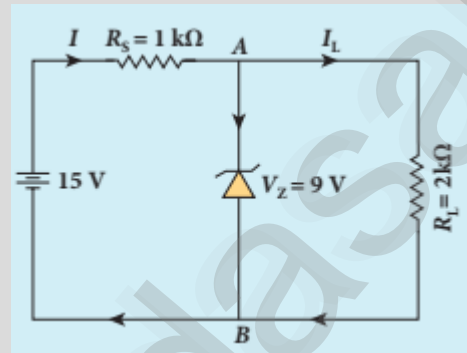
b) Four silicon diodes and a $10\ \Omega$ resistor are connected as shown in figure below. Each diode has a resistance of $1\ \Omega$. Find the current flows through the $10\ \Omega$ resistor



25 a) Describe the function of a transistor as an amplifier with the neat circuit diagram. Sketch the input and output wave forms.

(or)

b) find the current through the Zener diode when the load resistance is $2\ \text{k}\Omega$. Use diode approximation



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