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Reg. No. : .....

Name : .....

Fourth Semester B.Sc. Degree Examination, May 2021.

First Degree Programme under CBCSS

Physics

Complementary Course

PY 1431.1/PY 1431.3 MODERN PHYSICS AND ELECTRONICS

(For Mathematics and Statistics)

(2013, 2015 – 17 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

(Answer **all** questions in **one or two** sentences. Each question carries **1** mark.)

1. State Bohr's correspondence principle
2. What is Bohr's frequency condition?
3. What is meant by binding energy?
4. Explain the term transient equilibrium.
5. What is meant by probability density?
6. What is forward biasing of a pn junction diode?
7. Write the diode equation.

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8. Define the operating point or Q-point of a transistor.

9. Give the truth table for a two input OR gate.

10. State De Morgan's law

(10 × 1 = 10 Marks)

SECTION – B

(Answer **any eight** questions not Exceeding a paragraph.
Each question carries **2** marks.)

11. Give the basic features of Bohr atom model.

12. Explain spin-orbit splitting. What is its significance?

13. Discuss the salient features of nuclear forces.

14. Explain the operation principle of ionization chamber.

15. Give the principle of a Cernekov counter.

16. Explain the terms eigen value and eigen functions.

17. Explain a full wave rectifier.

18. Discuss about the frequency response of a transistor amplifier.

19. Explain and draw the dc load line and ac load line for a small signal amplifier.

20. Construct an XOR gate using NAND gate.

21. A logic circuit has three inputs A, B and C. Give its truth table if its output is Y=(A+B).(A+C). Draw the logic circuit also.

22. Explain the transistor action of a pnp transistor.

(8 × 2 = 16 Marks)

SECTION – C

(Answer **any six** questions. Each question carries **4** marks.)

23. The wavelength of the first member of Balmer series of hydrogen atom is 6563 A°. Calculate the wavelength of the second number.

24. The wavelength of the H_α line is 6563 A°. Find the wavelength of the H_γ line.

25. Calculate the energy difference between the ground state and the first excited state for an electron in a one dimensional rigid box of length 1 A°.

26. Evaluate the lowest energy that a neutron can have if it is confined move along the edge of an impenetrable box of length 10^{-14} m.

27. The half life of radon is 3.8 days. After how many days will only one twentieth of radon sample be left over?

28. Show that A+CB=(A+B)(A+C).

29. The transistor is connected with emitter grounded and has a current gain factor $\alpha = 0.95$. Find the change in base current, if the change in collector current is 1.9 mA.

30. Draw the logic circuit for the given Boolean expressions

    (a) Y = A+B

    (b) Y = (B+C)A.

31. If $L = \bar{x}y + x\bar{y}$ show that $\bar{L} = xy + \bar{x}\,\bar{y}$.

(6 × 4 = 24 Marks)

SECTION – D

(Answer **any two** questions. Each question carries **15** marks.)

32. What are the basic laws of radioactive disintegration? Derive an expression for the mean life of a radioactive element.

33. Obtain Schrodinger equation for a particle in a one dimensional box and derive the expression for eigen values.

34. Describe the fixed bias method, giving circuit diagram.

35. Explain the working of a pn junction diode in forward and reverse biasing.

(2 × 15 = 30 Marks)
