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Name : Dona. M

**Fourth Semester B.Sc. Degree Examination, July 2019**

**First Degree Programme under CBCSS**

**Complementary Course**

**PY 1431.1/PY 1431.3 MODERN PHYSICS AND ELECTRONICS**

**(For Mathematics and Statistics)**

**(2013 Admission onwards)**

Time : 3 Hours Max. Marks : 80

PART – A

Answer **all** questions. Each question carries **1** marks.

1. State Pauli's exclusion principle.
2. Write down the expression for the activity law of radioactive material.
3. What is packing fraction?
4. Give the position — momentum uncertainty principle.
5. Name any two nuclear detectors.
6. What is peak inverse voltage?

7. Explain d.c. load line.

8. Most of the transistors are npn type, why?

9. Distinguish between a nibble and a byte.

10. Give the truth table of a NAND gate.

**(10 × 1 = 10 Marks)**

## PART – B

Answer **any eight** questions. Each question carries **2** marks.

11. Briefly explain L-S coupling.

12. Explain the features of nuclear forces.

13. Briefly explain radioactive dating.

14. Give the probabilistic interpretation of wave function.

15. Describe Plank's hypothesis.

16. Define ripple factor. Compare the values of ripple factors of half–wave and full–wave rectifiers.

17. Distinguish between an avalanche break down and zener break down.

18. Explain biasing of a transistor. What is the need for biasing a transistor?

19. Draw the circuit diagram of a full wave bridge rectifier. Compare its input and out waveforms.

20. What are the advantages of voltage divider biasing?

21. Discuss the rules of binary addition, subtraction and multiplication.

22. How can you convert a decimal number into an octal number? Give an example.

**(8 × 2 = 16 Marks)**

## PART – C

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

23. If the disintegration constant of a radioactive substance is $9.345 \times 10^{-8}$, calculate its half-life period.

24. Calculate the wavelength associated with a particle of mass 0.01 gm moving with a velocity of 2000 m/s, h= $6.624 \times 10^{-34}$js.

25. Calculate the binding energy of an $\alpha-$ particle in Joules mass of $\alpha-$ particle=4.03188u, mass of proton = 1.00728u and mass of neutron = 1.00866u.

26. A Si diode dissipates 4W for a forward dc current of 3A. Calculate the forward voltage drop across the diode and its bulk resistance given knee voltage of Si diode = 0.7V.

27. If a transistor is biased with $V_{cc}$=12V, $R_c$ =2KΩ $I_B$ = 30 $\mu$A, then draw DC load line.

28. If the collector current changes from 2 mA to 3 mA in a transistor when collector emitter voltage is increased from 2V to by, what is the output resistance?

29. An ac supply of 230 V is applied to a half wave rectifier through a transformer of turn ratio10:1.Determine the dc output voltage.

30. Convert the decimal number 12.75 into its binary equivalent and $(11111001001)_2$ into its octal equivalent.

31. Draw the standard symbol and equivalent circuit of the NAND gate. Explain its logical operations.

**(6 × 4 = 24 Marks)**

## PART – D

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

32. Explain vector atom model. Discuss the quantum numbers associated with vector atom model.

33. A particle is in a box. Obtain its energy value and wave function.

34. Describe an experiment to draw the input and output characteristics of a CE-NPN transistor configuration. Indicate the active, saturation and cut-off regions.

35. What are logic gates? Discuss the logical operations of the basic gates using equivalent electronic circuits.

**(2 × 15 = 30 Marks)**

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