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Reg. No. : .....

Name : .....

Fourth Semester B.Sc. Degree Examination, March 2020

First Degree Programme under CBCSS

Complementary Course

PY 1431.3 – Modern Physics and Electronics

(For statistics)

(2018 Admission)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** questions in one or two sentences; each question carries **1**mark

1. What is the significance of Pauli's exclusion principle?
2. What are the four different quantum numbers?
3. What are the properties of beta rays?
4. What is carbon dating?
5. Give two properties of superconductors?
6. What is the purpose of Eigen values?
7. Which semiconductor device acts as a rectifier? Why?

P.T.O.

8. What is a zener diode?

9. What do you meant by stabilization of operating point?

10. What is faithful amplifications?

(10 × 1 = 10 Marks)

SECTION – B

Answer **any eight** questions, not exceeding a paragraph. Each question carries **2** marks

11. What are the basic features of Bohr atom model?

12. Explain the L-S and j-j coupling schemes?

13. What is meant by secular equilibrium?

14. What are the features of nuclear forces?

15. Explain Meissner effect?

16. Write a note on high temperature ceramic superconductors?

17. What is the inadequacy of classical mechanics?

18. What does quantum theory explains? Write down any one experimental evidence for quantum theory?

19. Write any three postulates of quantum mechanics?

20. Draw the input and out characteristics of CE configurations?

21. Draw the V-I characteristics of zener diode and explain?

22. Why CE configuration is commonly used?

(8 × 2 = 16 Marks)

SECTION – C

Answer **any six** questions; each questions carries **4** marks

23. Calculate the strength of the magnetic field required to give processional frequency of 100*MHz for* ^{17}O nucleus. Given $g_N = -0.757, \mu_N = 5.051 \times 10^{-27} JT^{-1}, I = 5/2$.

24. What is the nuclear g_N factor for the 19F nucleus which has a magnetic moment of 2.6273 μN. Nuclear spin quantum number I=1/2.

25. What are the frequency and wavelength of a photon whose energy equals the rest energy of an electron?

26. What is the de Broglie wavelength associated with an electron moving with a velocity $1.5 \times 10^7 m/s$.

27. Find the binding energy per nucleus $^{20}Ne_{10}$. Mass of proton = 1.007276u, mass of neutron =1.008665u and mass of $^{20}Ne_{10} = 19.987u$, $1u = 931.49MeV$.

28. In a common base connection, $I_E = 1mA, I_C = 0.95mA$, Calculate the value of I_B.

29. The half-life period of radium in 1620 years. In how many years will one gram of pure element lose 0.01gm?

30. A transistor uses potential divider method of biasing. $R_1 = 50\Omega$, $R_2 = 10\Omega$ *and* $R_E = 1k\Omega$. If $V_{CC} = 12V$, Find the value of IC. Given $V_{BE} = 0.1V$.

31. The current gain of a transistor in CE configuration is 49.What will be the current gain of same transistor in CB configurations?

(6 × 4 = 24 Marks)

SECTION – D

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

32. State and explain the law of radioactive disintegration. Derive expressions for half-life and mean life in terms of disintegration constant.

33. What is superconductivity? Distinguish between type-I and type-II superconductors? Mention the applications of superconductors

34. Derive Schrodinger's time dependent wave equation. What is the significance of wave functions?

35. With neat sketch explain the working of a Bridge rectifier. Derive an expression for the efficiency of full wave rectifier?

(2 × 15 = 30 Marks)
