



K22U 1573

Reg. No. :

Name :

**IV Semester B.Sc. Degree CBCSS (OBE) Regular/Supplementary/
Improvement Examination, April 2022
(2019 Admission Onwards)**

**COMPLEMENTARY ELECTIVE COURSE IN PHYSICS
4C04PHY : Electronics and Modern Physics**

Time : 3 Hours

Max. Marks : 32

PART – A

(Short answer questions, answer **all** questions, **each** question carries **1** mark.)

1. Using suitable reverse characteristics, show the differences in the breakdown of an ordinary diode and a Zener diode.
2. Give the truth table for a NAND gate.
3. What do you mean by packing fraction of a nucleus ?
4. List the basic parts of a nuclear reactor.
5. Give the quark composition of proton and neutron. **(5×1=5)**

PART – B

(Short essay questions, answer **any 4** questions, **each** question carries **2** marks.)

6. Discuss the mechanism of current flow in a forward biased pn junction.
7. Arrive at the relations connecting the current amplification factors

$$\beta = \frac{\alpha}{1-\alpha} \text{ and } \gamma = \frac{1}{1-\alpha}$$

8. Show that the Boolean expression $X = (\bar{A} + B) \cdot (A + B)$ can be simplified as B.
9. Draw the binding energy per nucleon versus mass numbers curve of atomic nuclei and explain the features.

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10. Explain nuclear fission and fusion reactions. Give an example for each.
11. Explain the distinction between particles and antiparticles. Give two examples. (4×2=8)

PART – C

(Problems, answer **any 3** questions, **each** question carries **3** marks.)

12. A half wave rectifier is used to supply 50 V dc to a resistive load of 800 ohms. The diode has a resistance of 25 ohms. Calculate the ac voltage required.
13. Find the operating frequency of a Collpitt's transistor oscillator if
 $C_1 = 0.001 \mu\text{F}$, $C_2 = 0.01 \mu\text{F}$ and $L = 15 \mu\text{H}$.
14. Convert the hexadecimal numbers 23, 575, 3A.2F to decimal.
15. How long will it take for 60% of a sample of radon to decay ? Given, the half-life of radon = 3.82 days.
16. Check whether the following reaction can occur or not ? State the reason.
 $\pi^- + p \rightarrow n + \pi^0$. (3×3=9)

PART – D

(Long essay questions, answer **any 2** questions, **each** question carries **5** marks.)

17. Explain the input and output characteristics of a transistor in CE configuration.
18. Explain what do you mean by half and full adders. Give their truth tables and explain how they can be realized.
19. What do you mean by natural radioactivity ? Discuss the basic properties of alpha, beta and gamma rays.
20. Discuss the various stages of stellar evolution. (2×5=10)
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