Reg. No. : ....

Name : ....

IV Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/ Improvement) Examination, April 2025
(2019 to 2023 Admissions)
COMPLEMENTARY ELECTIVE COURSE IN PHYSICS
4C04PHY : Electronics and Modern Physics

Time : 3 Hours

Max. Marks : 32

SECTION – A

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

1. What happens when a pn junction is reverse biased ?

2. What is the Zener breakdown voltage ?

3. What are the advantages of digital electronics ?

4. Why are even-even nuclei more stable than odd-odd nuclei ?

5. What is the difference between a black hole and a neutron star ?   **(5×1=5)**

SECTION – B

Short essay questions. Answer **any 4** questions, **each** question carries **2** marks.

6. Explain how transistor works as an amplifier.

7. What is a feedback circuit ?

8. What is a XOR gate ? What are the different features of a logic family ?

9. Draw the symbol of NAND gate and write down its truth table.

10. What are the properties of nuclear forces ?

11. What is meant by half life ? Derive an expression for it.   **(4×2=8)**

SECTION – C

Problems. Answer **any 3** questions, **each** carries **3** marks.

12. The voltage gain of an amplifier without feedback is 3000. Calculate the voltage gain of the amplifier if negative feedback is introduced in the circuit. Given that feedback fraction is 0.01.

13. A Colpitt's oscillator makes used the C1 = C2 = 0.001 μF1, L = 15 μH. Determine the (i) operating frequency and (ii) feedback fraction.

14. Prove that $(A + B) + (A + \bar{B}) = A$.

15. Calculate the binding energy of a $^{120}_{50}$Sn nucleus. Given atomic mass of ^{120}Sn = 119.9022u, mass of hydrogen atom = 1.00783u, mass of neutron = 1.00865u, 1u = 931.5 MeV.

16. A muon ($\bar{\mu}$) collides with a proton, a neutron plus another particle is formed. What is the other particle ? **(3×3=9)**

SECTION – D

Long essay. Answer **any two** questions, **each** carries **5** marks.

17. With circuit diagram, explain the working of a full wave bridge rectifier.

18. Explain the input and output characteristics of CE transistor characteristics.

19. Discuss the general properties of nucleus and obtain an expression for binding energy of nuclei.

20. Classify the elementary particles in detail. **(2×5=10)**

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