K23U 1138

Reg. No. : .....

Name : .....

IV Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/ Improvement) Examination, April 2023
(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. What is the difference between the breakdown voltage and the knee voltage of a P-N junction diode ?
2. In the breakdown region Zener diode behaves like a _____ source.
3. How will you obtain NOT gate from NAND gate ?
4. What are isobars ? Give an example.
5. What are white dwarfs ? **(5×1=5)**

PART – B

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

6. What is a ripple factor ? What is its value for a full wave and half wave rectifier ?
7. Explain the operation of a transistor as an amplifier.
8. Explain de Morgan's theorem.
9. Discuss the terms decay constant, half life and mean-life of a radio-active samples.
10. Explain the working of a full adder with the help of a circuit diagram.
11. Explain the Hertzsprung-Russel diagram of stars. **(4×2=8)**

P.T.O.

PART – C

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

12. The maximum collector current that a transistor can carry is 500 mA. If $\beta = 300$. What is the maximum allowable base current for the device ?
13. What do you mean by negative feedback in amplifiers ? The voltage gain of an amplifier is 3000. Calculate the voltage gain of the amplifier if a negative voltage feedback of feedback fraction 0.01 is introduced in the circuit.
14. Convert the octal numbers 1725.43, 140, 246.28 to decimal.
15. Find the energy needed to remove a proton from the nucleus of the calcium isotope $^{42}_{20}Ca$ also find the energy needed to remove a neutron from this nucleus. Why are these energies different ?
16. Give the quark composition of proton, neutron and π-meson and check the correctness of charge, Baryon number and spin. **(3×3=9)**

PART – D

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

17. What are crystal diode rectifiers ? Explain the half and full wave rectifier using a neat circuit diagram. Show the input and output waveforms.
18. What are universal gates ? Give the Boolean expression and truth table for NAND, NOR and XOR gate. Explain how the basic NOT, AND and OR gates be constructed using NAND.
19. What do you mean by nuclear fission and fusion ? Explain the carbon- nitrogen cycle and the resulting energy production.
20. Discuss the elementary particle quantum numbers and their conservation theorems. **(2×5=10)**
