K24U 0742

Reg. No. : .....

Name : .....

IV Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/ Improvement) Examination, April 2024
(2019 to 2022 Admissions)
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. Zener diode is activated only in _____.
2. Write down the relation between current amplification factors α, β and γ.
3. Which gates are known as universal gates and why ?
4. Radioactive dating is based on _____.
5. What is a quark ?

(5×1=5)

PART – B

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

6. Discuss the parameter ripple factor. How does its value vary between full wave and half wave rectifiers ?
7. Which are the unique characteristics of Zener diode ?

P.T.O.

8. Differentiate between analogue and digital signals.
9. Give the truth table and circuit diagram of a full adder.
10. Recall the definition of nuclear fission.
11. Explain the Chandrasekhar limit employed in astrophysics.

(4×2=8)

PART – C

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

12. In a common base connection, current amplification factor is 0.9. If the emitter current is 1 mA, determine the value of base current.
13. A 10-V zener diode is used to regulate the voltage across a variable load resistor [Figure 1]. The input voltage varies between 13 V and 16 V and the load current varies between 10 mA and 85 mA. The minimum Zener current is 15 mA. Calculate the value of series resistance R.

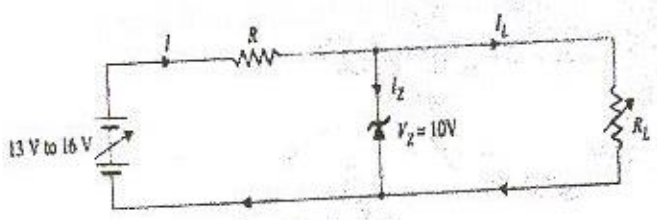

Figure 1

14. Convert the hexadecimal numbers 5BC, 8CF into the decimal system.
15. A particle has a mass equal to 10 amu. If this mass is converted completely into energy, how much energy is released ? Express your answer in electron volts (eV). (Recall that 1 eV = 1.6×10^{-19}J).
16. a) Based on quark composition of a proton, show that its charge is +1.
    b) Based on quark composition of a neutron, show that its charge is 0.

(3×3=9)