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 ?

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.
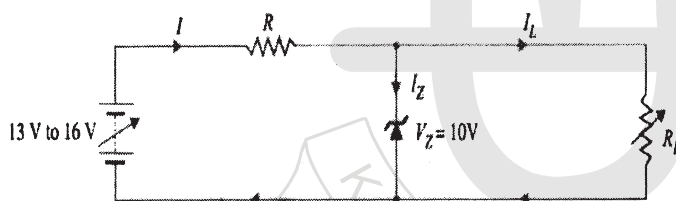

Figure 1

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 $= 1.6 \times 10^{-19}$ 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)**

PART – D

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

17. Elaborate on the elementary particle quantum numbers and their conservation laws.

18. State the law of radioactive decay. Discuss the Alpha, Beta and Gamma Rays and its properties in detail.

19. Give Boolean expression and truth table for NAND, NOR, XOR gates. Show how the basic NOT, AND and OR gates be constructed using NAND and NOR universal gates.

20. Define a p-n junction. Outline the working of pn junction in detail.   **(2×5=10)**

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