Reg. No. : .....

Name : .....

K21U 1137

IV Semester B.Sc. Degree CBCSS (OBE) Regular Examination, April 2021
(2019 Admission Only)
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. Draw typical forward IV characteristics of a Si and a Ge diode illustrating differences in their knee voltage.
2. Distinguish between analog and digital signals using suitable waveforms.
3. What are isobars ? Give an example.
4. What do you mean by the saturation property of nuclear forces ?
5. What do you mean by Chandrasekhar limit ?

(5×1=5)

PART – B

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

6. Explain the use of filter circuits in power supplies. Discuss the construction and operation of a capacitor filter.
7. What do you mean by CE configuration of a transistor ? Draw the output characteristics of a CE transistor.
8. Explain de Morgan's theorems.
9. Discuss the general properties : size, mass and density of an atomic nucleus.
10. Explain the law of radioactive decay. Discuss the terms half-life and mean-life of a radioactive sample.
11. Explain the Hertzprung-Russel diagram of stars.

(4×2=8)

P.T.O.

PART – C

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

12. In a common base connection of a transistor circuit, the emitter current is 1 mA. If the emitter circuit is open, the collector current is 50 μA. Find the total collector current if α is 0.92.

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 233, 362 and 6327.4051 to decimal.

15. Determine the energy needed to remove a neutron from the calcium isotope nucleus $^{42}_{20}Ca$. Given, the mass of $^{42}_{20}Ca$ = 41.958622 amu, mass of $^{41}_{20}Ca$ = 40.962278 amu and the mass of free neutron = 1.008665 amu.

16. Give the quark composition of proton and neutron 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. Discuss the working principle of a full wave bridge 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 a NAND gate. Explain how the basic NOT, AND and OR gates be constructed using NAND.

19. What do you mean by nuclear 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)**
