

Reg. No. :

Name :

Fourth Semester B.Sc. Degree Examination, May 2021

First Degree Programme under CBCSS

Physics

Complementary Course

PY 1431.1 : MODERN PHYSICS AND ELECTRONICS

(For Mathematics)

(2018 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in **one** or **two** sentences. **Each** question carries **1** mark.

1. AC load line is based on _____ load resistance.
2. The sum of number of protons and neutrons is called _____?
3. Which of the following statements with reference to nuclear forces is not true?
 - (a) Short range
 - (b) strongest force
 - (c) Charge independent
 - (d) Spin independent

4. The NAND gate is AND gate followed by _____ gate
5. A variable quantity which mathematically describes the wave characteristics of a particle is _____?
6. _____ input values will cause an AND logic gate to produce a HIGH output. (HIGH/LOW)
7. The linear partial differential equation which describes the wave function is _____ equation.
8. The value of radix in binary number system is _____.
9. Convert the binary equivalent 10101 to its decimal equivalent.
10. Find the odd one
 - (a) Beta decay
 - (b) Alpha decay
 - (c) Gamma decay
 - (d) Delta decay

(10 × 1 = 10 Marks)

SECTION – B

Answer any **eight** questions; not exceeding a paragraph. **Each** question carries 2 marks.

11. Write short note on alpha decay, Beta decay and Gamma decay.
12. What do you understand by the term wave function?
13. Write note on BJT
14. What is AND gate?

15. What are the applications of Schrodinger wave equation?
16. Define the different operating regions of a transistor.
17. Write short note on Hexadecimal number system.
18. What is mean by normalisation process; write down the normalised wave function for an electron in a one dimensional potential well of length 'a' meters.
19. Write short note on Binary number system.
20. How α and β are related to each other in a transistor?
21. What are nuclear forces, Give their features.
22. With the help of binding energy curve explain nuclear fission process.

(8 × 2 = 16 Marks)

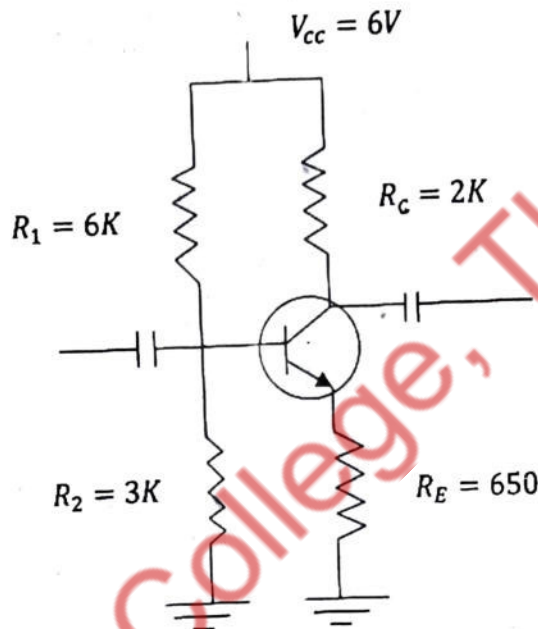
SECTION – C

Answer any **six** questions not exceeding a paragraph. **Each** question carries **4** marks.

23. A radioactive isotope disintegrates to one tenth of its original mass in 10 days. Find its half life period.
24. What is the largest decimal value that can be represented by
 - (a) A 8 bit number
 - (b) A 16 bit binary number

25. A particle with mass m is in an infinite square well potential with walls at $x = -L/2$ and $x = L/2$. Write the wave functions for the states $n=1$, $n=2$ and $n=3$.

26.



Calculate the emitter bias current for the transistor amplifier circuit shown in above figure.

27. Convert the following hexadecimal number to decimal.

(a) $1C_{16}$ (b) $A85_{16}$ (c) $E5_{16}$ (d) $B2F8_{16}$

28. Prove the Boolean identity $A + \overline{A}B = A + B$

29. Given the following isotope masses,

${}^7_3\text{Li} = 7.016004$, ${}^6_3\text{Li} = 6.015125$, ${}_0^1n = 1.008665u$, Calculate the B.E of a neutron in the

${}^7_3\text{Li}$ nucleus. Express the result in u, Mev .

30. In a transistor the emitter and collector are of the same type of semiconducting material. But they cannot be interchanged in a circuit connection. Explain why?

31. Determine the total number of possible input combinations of a 4 input OR gate. Develop the truth table.

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions; not exceeding a paragraph. Each question carries

15 marks

32. Derive the one dimensional Time dependent Schrodinger equation for a free particle.

33. What is Boolean algebra? Discuss about the Laws and Rules of Boolean algebra.

34. Write notes on the basic properties of nuclei.

35. Which are the different transistor configurations, Write notes on Common Collector Connection and compare the various characteristics of the three connections.

(2 × 15 = 30 Marks)

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