(b) Convert the following decimal numbers to binary. 4

89 , 75.66

(c) Convert the following binary numbers to decimal: 4

1011 , 1101·1011

(d) Why is NAND gate called universal logic gate. Construct OR gate using NAND gate. 4

UNIT - V

9. (a) What is modulation? Why is modulation necessary in communication system? 7

(b) Define amplitude modulation. Show that an amplitude modulation wave can be represented by a carrier and two sideband frequencies for each frequency of modulation. 7

10. (a) Why does amplitude modulation give noisy reception? 3

(b) What is frequency modulation? Distinguish between amplitude and frequency modulation. 7

(c) Derive the expression for the FM voltage wave. 4

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PG (CBCS) EVEN SEMESTER EXAMINATION, 2023

PHYSICS
2nd Semester

Course No. : PHYCC - 203 C
(Electronic Devices and Circuits)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

(Answer five questions, taking one from each unit)

UNIT - I

1. (a) What is an intrinsic semiconductor? Describe briefly how p-type and n-type semiconductors are developed from pure selicon. 7

(b) State the differences among a metal, a semiconductor and an insulator with the help of band theory of solids. 7

2. (a) What is a semiconductor? Discuss some important properties of semiconductor. 7

(b) What is the need of adding impurity to an intrinsic semiconductor? 2

(c) What is the effect of temperature on extrinsic semiconductor? 2

(d) What are an electron and a hole? How is a hole created? 3

UNIT - II

3. (a) What is a P-N junction diode? Explain the formation of the depletion region in a P - N junction diode. 7

(b) Explain the construction and working of an n-p-n transistor. 7

4. (a) Explain the current-voltage (I-V) characteristics of a p-n junction diode under forward and reverse bias mode. 7

(b) What is a Zener diode? What is the avalanche breakdown in Zenor diode? 2+2=4

(c) What is thermal runway? How is it minimized? 3

UNIT - III

5. (a) Explain the working of a half-wave rectifier. Give proper circuit diagram. 7

(b) Show that the maximum rectifier efficiency of half-wave recitifier is 40.6%. 5

(c) What is the ripple factor of a half-wave rectifier? 2

6. (a) State the Barkhausen criteria for sustained oscillation. 2

(b) What are the essential components of a transistor oscillator? What is the difference between amplifer and oscillator? 5

(c) Give the construction and working of a bridge-type rectifier. 7

UNIT - IV

7. (a) Simplify the following Boolean expressions:

(i) $Y = AB + A (B+C) + B (B+C)$ 4x2=8

(ii) $Y = AB + ABC + \overline{A}B + A\overline{B}C$

(iii) $Y = (A + B) (A + \overline{B}) (\overline{A} + \overline{B})$

(iv) $Y = (A + B + C) (A + B)$

(b) Explain how we realise OR gate in Lab with diodes. Also write the Boolean expression and truth table. 6

8. (a) State De-Morgan's theorem. 2