Duration: 3 Hours   **Max. Marks: 75**

Instructions:

- It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.
- Answer any four questions from Part-B in detail.
- Different sub-parts of a question are to be attempted adjacent to each other.

PART A

Q1 (a) What is zener diode? Write applications of zener diode.   (1.5)

(b) Write De Morgan's theorems.   (1.5)

(c) Differentiate between sequential circuits and combinational circuits. (1.5)

(d) Draw the Common emitter (CE) configuration of BJT and write its two applications.   (1.5)

(e) Draw symbol of PN junction diode and plot its forward bias and reverse bias characteristics.   (1.5)

(f) What does GSM and GPRS stand for?   (1.5)

(g) Implement AND gate using NOR gate only. Why NAND and NOR gates are called universal gates?   (1.5)

(h) State the characteristics of an ideal OP-AMP.   (1.5)

(i) What is the Barkhausen criteria of oscillations?   (1.5)

(j) Draw the truth table of a FULL subtractor circuit.   (1.5)

PART B

Q2 (a) Compare Half-wave and Full-wave rectifier. Also, describe the operation of Full-wave rectifier and Bridge rectifier using relevant waveforms. (10)

(b) Explain the working of Zener diode as a voltage regulator.   (5)

Q3 (a) Compare Analog digital processing with Digital signal processing. Also, draw analog-continuous, analog-discrete, digital-continuous and digital discrete signals.   (5)

(b) Simplify the expression using K-maps and implement using basic gates $F(A, B, C, D) = \sum m$ (0, 2, 3, 6, 7, 8, 10, 12, 13)   (5)

(c) Draw and explain a simple block diagram of a microprocessor. (5)

Q4 (a) Derive the expression of frequency of oscillation of Wein bridge oscillator. (5)

(b) Explain the application of OP-AMP as a differentiator and adder. (10)

Q5 (a) Draw and explain a block diagram of GSM system. (5)

(b) Why modulation of a signal is carried out? Explain in detail what are AM and FM and how these modulations are carried out? (10)

Q6 (a) Draw and discuss the CE amplifier configuration using BJT. Explain the input and output characteristics of the configuration. (10)

(b) What is a Multiplexer? Implement 16:1 MUX using (i) 4:1 MUX (ii) 2:1 MUX (5)

Q7 (a) What is the meaning of regulated power supply? What is the difference between 78** and 79** series of IC regulator? (5)

(b) Using truth tables and K-maps, design and explain the working of Half-adder and Full-adder circuits. Write their logical expressions in SOP and POS forms. (10)