(T) Roll No. .....

PAPER ID—11697

B.Tech. EXAMINATION, 2025

(Seventh Semester)

COMPUTER SCIENCE AND ENGINEERING

Open Elective Course-IV

Electronic Principles

Time : 3 *Hours* *Maximum Marks :* 70

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. **1** is compulsory. All questions carry equal marks.

(Compulsory Question)

1. (a) Define knee voltage in the V–I characteristics of a P–N junction diode. **2**

(b) Write any *two* differences between BJT and MOSFET. **2**

(c) What is the role of a DIAC in triggering a TRIAC ? **2**

(d) Mention any *two* advantages of LCD over LED displays. **2**

(e) State the universal property of NAND gate. **2**

(f) Draw the block representation of a seven-segment display. **2**

(g) What is the function of a Zener diode in electronic circuits ? **2**

Unit I

2. (a) What is the load-line for a diode ? Explain static DC load lines. Show how the Qpoint is obtained. Illustrate with a suitable diode circuit. 7

(b) Explain the V–I characteristics of a P–N junction diode. Describe forward bias and reverse bias regions, knee voltage, breakdown region and the significance of minority and majority carrier currents. Draw and explain the characteristic curve. 7

3. (a) Describe the operation of a P–N junction diode as a rectifier. Explain half-wave rectification principles. Derive the expressions for average and RMS output voltage. 7

(b) Describe clipping and clamping circuits with examples. Explain the working of series and shunt clippers. Draw waveforms to show input and output relationships. 7

Unit II

4. (a) Explain the construction, working principle and characteristics of an LED. Discuss, how light is emitted, the materials used, the V–I characteristics and typical applications ? 7

(b) Describe the operation of a Zener diode as a voltage regulator. Explain the Zener breakdown mechanism, Zener equivalent circuit. 7

5. (a) Explain the working principles and characteristics of UJT. Discuss UJT relaxation oscillator with diagrams. 7

(b) Describe the structure, characteristics and applications of DIAC. Explain their bidirectional operation, V–I characteristics and use in AC power control circuits. 7

Unit III

6. (a) Describe the construction, operation and types of LCD displays. Explain the role of polarizers, backlighting and their advantages and limitations. 7

(b) Explain the working of a seven-segment display. Discuss the internal LED arrangement, common anode and common cathode configurations and illustrate digit formation from 0–9. 7

7. (a) Explain the driving circuitry required for seven-segment and sixteen-segment displays. Discuss decoder/driver ICs, current-limiting requirements, multiplexing method, and interfacing concepts. 7

(b) Compare LED and LCD display technologies. 7

Unit IV

8. (a) Convert the $(257)_8$ octal number to decimal and Convert the 175 decimal number to hexadecimal. Explain the conversion steps. 7

(b) State and prove any *four* basic laws of Boolean algebra. Using suitable examples. 7

9. (a) Describe the operation J–K flip-flops. Explain their truth tables, excitation tables, and typical applications in digital circuits. 7

(b) Differentiate between combinational circuits and sequential circuits, Using Suitable examples. 7

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