

(3 Hours)

[Total Marks :80]

- N.B. :** (1) Question no. 1 is compulsory.
 (2) Attempt **any three** questions from remaining **five** questions.
 (3) Assume suitable data if required

1. Solve any five

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- (a) Convert $(41.62)_8$ to decimal, binary and hexadecimal
 (b) Compare BJT and FET.
 (c) Why Zener diode is used as a regulator?
 (d) Define (i) Slew rate (ii) CMRR. What are the typical values of slew rate and CMRR for Op-amp IC- 741?
 (e) Convert JK-flip flop to D flip flop
 (f) What do you mean by Universal gate? Implement Ex-OR gate using NAND gate.

2. (a) What is the need of biasing? Explain Voltage divider bias and locate Q point.

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(b) Design half adder using VHDL.

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(c) Simplify $AB + B + \overline{AC} + A\overline{BC} (AB + C)$

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$$AB + B + \overline{AC} + A\overline{BC} (AB + C)$$

3. (a) Minimize the following Boolean function using K-map

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$$F(A, B, C, D) = \sum m(0, 3, 7, 11, 15) + d(1, 2, 5)$$

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(b) Explain Differentiator using Op-amp

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(c) Explain the working of Liquid Crystal display.

4. (a) Design and implement 4 bit binary to gray code converter.

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(b) Implement $F(A, B, C, D) = \sum m(1, 2, 5, 11, 14) + d(0, 3)$ using 8:1 multiplexer.

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(c) Explain inverting amplifier using Op-amp. Derive expression for output voltage.

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5. (a) Explain the working of astable multivibrator using IC-555. Design astable multivibrator for output frequency 5KHz and duty cycle 30%.

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(b) Differentiate between combinational and sequential logic circuits.

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(c) Design mod-3 up counter using JK flip-flop

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6. Write notes on Any four :-

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(a) Instrumentation amplifier using 3-OP-Amps.

(b) Shift registers.

(c) Race around condition.

(d) Current mirror circuit.

(e) Multiplexers and De multiplexers.