2021

DIGITAL ELECTRONICS AND LOGIC DESIGN

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. Answer the following questions: 10*2=20

   a) What is Excess-3 code? Give one example.

   b) What is K-map? What is the use of it?

   c) Give the full form of EPROM and EEPROM.

   d) Convert $(10110.011)_2$ to decimal number.

   e) Convert $(ABAB.1F)_{16}$ to binary number.

   f) Perform subtraction (10-27) using 2's complement method.

   g) Perform addition (37+45) using BCD addition.

   h) Convert $(89.75)_{10}$ to octal number.

   i) What is the difference between Analog signal and Digital signal?

   j) Write the steps involved in Binary to Gray code conversion.

2. a) A 7-bit Hamming code is received as 1011011. Assume Even parity & state whether the received code is correct or not, if wrong locate the bit in error. 7

b) Why NAND gate and NOR gates are referred as Universal gate? Implement EX-OR logic gate using only NOR gate. 2+3=5

c) Describe the basic theorems and properties of Boolean Algebra. 8

3. a) State and prove both the laws of De-Morgan's theorem. 5+5=10

b) Minimize the following logical function using K-map. 10

(Note: Show each and every step and also give justification for each step)

Y= A'B'C D' + A'BC'D' + A'BC'D+ A'BCD'+ ABC'D' + ABC'D

4. Verify the following using truth table method: 2.5*2=5

a) i) **(AB+B′ +(AB)′) ′ = 0**

ii) **(A′+B).(A+B′) = (AB+A′B′)**

b) Expand **(A'+B')** to minterms and maxterms. 8

c) Explain 16:1 Multiplexer using 4:1 multiplexers only and explain its operation. 7

5. a) Using don't care condition find reduced SOP equation and draw the circuit diagram using **basic gates** 7

F(P,Q,R,S) = ∑(1,2.3,6,12,14) + d(0,11,13)

b) Reduce the given POS function using K-map and draw the circuit diagram using **only NOR** gate. 8

F(A,B,C,D) = ∏ (0,1,2.3,7,8,9,10,11)

c) Explain S-R flip-flop and J-K flip-flop in details with diagrams. 5

6. a) Explain the full adder circuit with the help of function table and circuit diagram. 10

b) With Logic diagram and truth table explain the working of 8 to 3 line encoder. 10

7. Write short notes on any five of the following: 5*4=20

a) Multiplexer and Demultiplexer

b) Encoder and Decoder

c) RAM and ROM

d) Primary Memory and Secondary Memory

e) Half subtractor

f) Even Parity and Odd Parity