21415

3 Hours/100 Marks

Seat No.

Instructions : (1) **All** questions are **compulsory**.

(2) Illustrate your answers with **neat** sketches **wherever** necessary.

(3) Figures to the **right** indicate **full** marks.

(4) Assume **suitable data**, if necessary.

MARKS

1. A) Attempt **any six** :   **12**

   a) Convert the decimal no. 46 into BCD code and in excess 3 code.

   b) Give the two advantages of multiplexer.

   c) State the different triggering methods in digital circuit.

   d) State the various types of shift registers.

   e) Identify the IC 0800 and IC 0809.

   f) Compare EPROM and EEPROM (any two pts.).

   g) Write associative and commutative Boolean laws.

   h) Draw the logic symbol and truth table for two input NAND gate.

   B) Attempt **any two** :   **8**

   a) Solve the following subtraction using 1's and 2's complement method.

      i) $(52)_{10} - (65)_{10}$

      ii) $(101011)_2 - (11010)_2$.

   b) Explain Full adder with its truth table, K-map simplification and logic diagram.

   c) Design a 4 : 1 MUX using 2 : 1 MUX and write truth table.

2. Attempt **any four** : 16

   a) Perform the following multiplication in binary number system $(15)_{10} \times (8)_{10}$.

   b) State and prove the both De-Morgan's theorems with logic diagram.

   c) Explain the concept of Minterm and Maxterm with example.

   d) Draw and explain OR flip flop using NAND gate with its truth table.

   e) Draw the circuit diagram of 3 bit synchronous up counter with its truth table and explain its working.

   f) Define the following specifications of DAC :

      i) Resolution

      ii) Linearity

      iii) Accuracy

      iv) Settling time.

3. Attempt **any four** : 16

   a) State the rules for BCD addition.

   b) Compare CMOS and TTL logic family on following points : propagation delay, fan out, power dissipation, Noise immunity.

   c) Design 1 : 16 demultiplexer using 1 : 4 demultiplexer.

   d) Compare combinational circuit with sequential circuit (any 4 points).

   e) Draw the block diagram of dual slope ADC and explain its working with waveforms.

   f) State the different types of ROMs and explain any one type of ROM.

4. Attempt **any four** :   **16**

   a) Design a 3 : 8 line decoder with truth table and logic diagram and give IC No. for the same.

   b) Draw and explain decimal to BCD priority encoder using IC 74147.

   c) What is race around condition in JKFF ? How it can be avoided ?

   d) Explain the working of 4 bit ring counter with a neat diagram.

   e) Describe successive approximation ADC with neat circuit diagram.

   f) Compare Static RAM with Dynamic RAM (any 4 pts.).

5. Attempt **any four** :   **16**

   a) Draw the circuit of TTL totem pole two input NAND gate and explain its working.

   b) Draw and explain the circuit diagram of 1 : 4 demultiplexer using logic gates.

   c) Explain with neat diagram. How to convert JK flip flop into TFF ? Write truth table.

   d) How can IC 7490 be used as a decade counter with neat block diagram ?

   e) How many bits are required for a resolution of 5 mV and full scale voltage is 15 V ?

   f) Compare volatile and non-volatile memory (any 4 pts.).

6. Attempt **any four** :   **16**

   a) Convert the following :

      i) $(5C7)_{16} = (?)_{10}$

      ii) $(2598)_{10} = (?)_{16}$

      iii) $(10110)_2 = (?)_{10} = (?)_{16}.$

   b) Why NAND & NOR gates are called as an universal gates ? Realise OR gate using NAND gate.

c) Reduce the following Boolean expression using Boolean laws :

i) $Y = A\overline{B} + \overline{A}B + AB + \overline{A}\,\overline{B}$

ii) $Y = A\overline{B}C + \overline{A}BC + ABC$.

d) Realize the following function using demultiplexer :

i) $F_1 = \Sigma m\,(0, 1, 3, 7, 11, 13, 15)$

ii) $F_2 = \Sigma m\,(2, 4, 8, 10, 12)$.

e) Design MOD 10 asynchronous up counter, with its truth table and timing diagram.

f) Calculate the analog output of a 4 bit DAC, if the digital input is 1011. Assume VFS = 5 V.

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