

17320

15116

3 Hours / 100 Marks

Seat No.

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- 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.
(5) Use of Non-programmable Electronic Pocket Calculator is permissible.
(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any TEN :

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- (a) Convert following binary numbers to decimal :
(i) 101011 (ii) 110011
- (b) Convert following hexadecimal numbers to decimal :
(i) 2CH (ii) A9DH
- (c) Convert following decimal numbers to octal :
(i) 26 (ii) 44
- (d) Draw symbol and truth table of :
(i) AND gate (ii) NOR gate
- (e) State commutative and associative laws.
- (f) Prove : $A(1 + \bar{A}) = A$
- (g) Draw the symbol and write logical equation of output for 'EX-OR' and 'EX-NOR' gates.
- (h) Implement given logical equation using logic gates – $Y = AB + CD$
- (i) Convert given SOP equation in standard SOP equation :
$$Y = \bar{A}BC + B\bar{C} + AC$$
- (j) Draw the logic diagram of half subtractor and write its truth table.
- (k) Define : (i) MUX (ii) De-MUX

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- (l) Draw the diagram of one bit memory cell using NAND gates only.
- (m) State drawback of S-R flip-flop. How is it overcome ?
- (n) Draw the symbol of D flip-flop and write its truth table.

2. Attempt any FOUR :

16

- (a) Perform following binary operations :
 - (i)
$$\begin{array}{r} 1011 \\ \times 101 \\ \hline \end{array}$$
 - (ii)
$$\begin{array}{r} 1101 \\ - 110 \\ \hline \end{array}$$(using 2's complement method)
- (b) Draw the circuit diagram of CMOS inverter. Explain its operation.
- (c) Design full adder using K-map technique.
- (d) Draw the logical diagram of clocked S-R flip-flop using NAND gate only. Write its truth table.
- (e) With the help of circuit diagram, describe the operation of weighted resistor DAC.
- (f) Compare EPROM and FLASH memory.

3. Attempt any FOUR :

16

- (a) Perform following BCD operations :
 - (i)
$$\begin{array}{r} 16 \\ + 27 \\ \hline \end{array}$$
 - (ii)
$$\begin{array}{r} 35 \\ - 19 \\ \hline \end{array}$$
- (b) State and prove DeMorgan's theorems.
- (c) Simplify given SOP equation using K-map technique –
 $Y = \sum m (0, 1, 2, 3, 4, 5, 7, 12, 13, 15)$
- (d) Draw the circuit diagram of master-slave J-K flip-flop using NAND gates and explain its operation.
- (e) Draw the block diagram of single slope ADC. State its disadvantage.
- (f) Draw organization of 8×8 memory and label it.

4. Attempt any FOUR :

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- (a) Obtain :
 - (i) 2's complement of 110011
 - (ii) Gray code of 1101

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- (b) Compare TTL and CMOS logic families.
- (c) Draw and write truth table of 8:1 MUX tree using 4:1 MUX.
- (d) Describe application of shift register as ring counter.
- (e) Draw the block diagram of SAR ADC and write its operation in brief.
- (f) Compare :
 - (i) static and dynamic memory (two points)
 - (ii) volatile and non-volatile memory (two points)

5. Attempt any FOUR :

16

- (a) Draw TTL NAND gate and write its truth table.
- (b) How is Demux used as Decoder ? Write truth table of 3:8 decoder.
- (c) Draw the diagram of 3 bit ripple counter and write its operation.
- (d) Draw logic diagram of 4 bit serial-in serial-out shift register and its output waveform.
- (e) Describe the working principle of dual slope ADC with its block diagram.
- (f) Explain classification of memories. What is flash memory ?

6. Attempt any TWO :

16

- (a) Draw internal block schematic of 7490 decade counter. Describe its operation.
Draw output waveform.
 - (b) Identify function of following IC numbers :
 - (i) 74244 (ii) 74245
 - (iii) 74151 (iv) 74155Describe any two of the above IC with its truth table.
 - (c) Draw the diagram of 3 bit R-2R ladder DAC. Derive the mathematical expression for digital input 101.
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