



17333

15162

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) *All questions are compulsory.*
 - (2) *Answer each next main question on a new page.*
 - (3) *Illustrate your answers with neat sketches wherever necessary.*
 - (4) *Figures to the right indicate full marks.*
 - (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. a) Attempt any six of the following :	12
i) List the applications of digital systems.	2
ii) Define the following terms.	2
1) Noise Immunity	
2) Propagation Delay	
iii) Draw logical symbol and truth table of X-NOR gate.	2
iv) Which are the universal gates ? Why they called it ?	2
v) Convert $(268.75)_{10} = (?)_2$.	2
vi) Give the examples of associative and distributive law of boolean algebra.	2
vii) Name the IC for digital comparator and ALU.	2
viii) Define any two specifications of DAC.	2
b) Attempt any two of the following :	8
i) Compare CMOS and TTL logic families on following parameters.	4
1) Propagation Delay	
2) Fan-out	
3) Speed-power Product	
4) Noise Immunity	
ii) Implement X-NOR gate by using	4
1) NAND gate only	
2) NOR gate only	
iii) Convert the following :	4
1) $(327.89)_{10} = (?)_{BCD}$	
2) $(237)_8 = (?)_{10}$	
3) $(1011001)_2 = (?)_8$	
4) $(249)_{10} = (?)_2$	

P.T.O.

**Marks**

- 2. Attempt any four of the following :** **16**
- a) State and prove De-Morgan's Theorems. **4**
- b) For the logic expression given below **4**
- $$F = \bar{X}.Y + X.\bar{Y}$$
- 1) Obtain the truth table.
- 2) Name the operation performed from truth table.
- 3) Realize this operation using AND, OR, NOT gates.
- 4) Realize this operation using only NAND gates.
- c) Perform the following subtraction using 2's complement method. **4**
- 1) $(01000)_2 - (01001)_2$ 2) $(01100)_2 - (00011)_2$
- d) Minimize the following expression using K-map. **4**
- $$F(A, B, C, D) = \pi M(1, 4, 6, 9, 10, 11, 14, 15)$$
- e) Design a full adder using half adder. **4**
- f) Draw the block diagram of ALU IC 74181 and explain the function of all pins. **4**
- 3. Attempt any four of the following :** **16**
- a) Prove the following using the algebraic theorems **4**
- 1) $A + \bar{A}B + A\bar{B} = A + B$
- 2) $AB + \bar{A}B + \bar{A}\bar{B} = \bar{A} + B$
- b) Obtain an 1 : 8 demultiplexer using 1 : 4 demultiplexer. **4**
- c) Minimize the following function using K-map. **4**
- $$F = \sum m(0, 1, 2, 3, 11, 12, 14, 15)$$
- d) Convert $F(A, B, C) = \sum m(1, 4, 5, 6, 7)$ in standard POS form. **4**
- e) Explain the functions of 'preset' and 'clear' inputs in flip-flops. **4**
- f) Explain 3-bit synchronous counter with truth table and timing diagram. **4**
- 4. Attempt any four of the following :** **16**
- a) Distinguish between synchronous and asynchronous counter. **4**
- b) Compare weighted resistor DAC and R-2R DAC. **4**
- c) Draw neat circuit diagram of clocked JK flip-flop using NAND gates. Give its truth table and explain race around condition. **4**



Marks
16

6. Attempt **any two** of the following :

- a) i) Define and draw the logical symbol of a demultiplexer. **2**
ii) Realize the logic function of the truth table given below using a multiplexer. **6**

A	B	C	Y
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0

- b) i) Draw the symbol and truth table of T flip flop for Negative Edge Triggered. **2**
ii) List different types of shift registers. **2**
iii) Compare counters and shift registers. **4**
- c) i) With suitable diagram describe successive approximation ADC. **4**
ii) List any four specifications of ADC. **4**
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