

# 22320

**21819**

**3 Hours / 70 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) Assume suitable data, if necessary.
  - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

- 1. Attempt any FIVE of the following: **10****
- a) List the binary, octal and hexadecimal numbers for decimal no. 0 to 15.
  - b) Define fan-in and fan-out of a gate.
  - c) Compare between synchronous and asynchronous counter (any two points).
  - d) State two specification of DAC.
  - e) Write the gray code to given no.  $(\perp\perp0\perp)_2 = (?)$  Gray.
  - f) Define encoder, write the IC number of IC used as decimal to BCD encoder.
  - g) Draw the logical symbol of EX-OR and EX-NOR gate.

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- 2. Attempt any THREE of the following:** **12**
- a) Convert:
- (i)  $(AD92 \cdot BC A)_{16} = (?)_{10} = (?)_8 = (?)_2$
- b) Simplify the following and realize it
- $$Y = A + \overline{A}BC + \overline{A}B\overline{C} + ABC + \overline{A}\overline{B}$$
- c) Explain the flowing characteristics w.r.t logic families:
- (i) Noise margin
- (ii) Power dissipation
- (iii) Figure of merit
- (iv) Speed of operation
- d) Draw logic diagram of half adder circuit.
- 3. Attempt any THREE of the following:** **12**
- a) Draw the circuit of successive approximation type ADC and explain it's working.
- b) Describe the operation of R-5 flip-flop using NAND gates only.
- c) Give classification of memory and compare RAM and ROM (any four points).
- d) State the applications of shift register.
- 4. Attempt any THREE of the following:** **12**
- a) Subtract the given number using 2's complement method:
- (i)  $(\perp\perp0\perp\perp)_2 - (\perp\perp\perp00)_2$
- (ii)  $(\perp0\perp0)_2 - (\perp0\perp)_2$
- b) State De-Morgan's theorem and prove any one.
- c) Compare between PLA and PAL.
- d) Reduce the following expression using K-map and implement it
- $$F(A, B, C, D) = \pi M(1,3,5,7,8,10,14)$$
- e) Describe the working of J-K flip-flop and state the race around condition.

**5. Attempt any TWO of the following:****12**

- a) Design BCD to seven segment decoder using IC 7447 with its truth table.
- b) Describe the working of 4 bit universal shift register.
- c) Design basic logic gates using NAND and NOR gate.

**6. Attempt any TWO of the following:****12**

- a) Design a mod-6 Asynchronous counter with truth-table and logic.
  - b) Design  $1:8$  demultiplexer using  $1:4$  demultiplexer.
  - c) Draw the circuit diagram of 4 bit R-2R ladder DAC and obtain its output voltage expression.
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