

END TERM EXAMINATION

THIRD SEMESTER [B.TECH] DECEMBER 2025-JANUARY 2026

Paper Code: ECC-207 Subject: Digital Logic and Computer Design

Time: 3 Hours

Maximum Marks: 60

Note: Attempt any five questions including Q.No.1 which is compulsory.
Select one question from each unit. Assume missing data if any.

- Q1 Answer the following: (4x5=20)
- Compare weighted codes with unweighted codes. Give an example of an unweighted code which is self-complementing.
 - Given $PQ' + P'Q = S$, then, show that $PS' + P'S = Q$.
 - Design a one-bit comparator along with its truth table and proper diagram.
 - Differentiate between RISC and CISC architectures in computer organization. What is an interrupt and how does it affect the flow of data?
 - Describe the working of a 4 bit Johnson counter with a suitable diagram.

UNIT-I

- Q2 i) Implement the given logical expressions with the help of a multiplexer:
a) $Y_1 = \sum_m(0,2,3,8,12,14)$ b) $Y_2 = \sum_m(1,2,3,7,9,10,15)$ (6)
ii) Design an odd parity generator using minimum number of logic gates. (4)
- Q3 i) Implement a full subtractor using 3x8 decoder. (4)
ii) Find the minimal expression for the following expression using Quine-McCluskey method: (6)
 $Y = \sum_m(1,2,5,7,9,12,13,15) + \sum_d(0,3,8)$

UNIT-II

- Q4 i) Design a synchronous modulo-10 up/down counter using T flip-flops. (6)
ii) Describe the working of master-slave JK flip-flop with a suitable diagram and explain how will it remove the race around condition? (4)
- Q5 i) Convert JK flip-flop into D flip-flop. (4)
ii) Implement the given Boolean expression using PAL and PLA. (6)
 $Y_1 = A'BC' + A'B'C' + AB'C + ABC'$
 $Y_2 = A'B'C' + A'B' + AB' + ABC'$
 $Y_3 = A'BC' + A'B'C' + ABC + ABC'$

UNIT-III

- Q6 i) What is the difference between hardwired control and microprogrammed control? Is it possible to have a hardwired control associated with a control memory? (5)
ii) Explain the different phases of an instruction cycle using a flow diagram. (5)

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- Q7 i) Explain the working of a microprogrammed control unit with a suitable diagram. (5)
ii) What is meant by addressing modes? Describe different types of addressing modes used in microprogramming in detail. (5)

UNIT-IV

- Q8 i) What is the basic advantage of using interrupt initiated data transfer over transfer under program control without an interrupt? (5)
ii) How does memory management provides memory protection?(5)
- Q9 i) How is interrupt initiated I/O different from direct memory access mode of data transfer? Describe in detail. (5)
ii) Write short notes on (5)
a) Content-addressable memory
b) Virtual memory
