



R22 Regulation

Subject code: 4E4BB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

TKRCET
INDIA'S CHALLENGE • INNOVATION IN EXCELLENCE

B.Tech IV Semester Supplementary Examinations, December 2025

DIGITAL ELECTRONICS

(EEE)

Maximum Marks: 60

Date: 18.12.2025

Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	How many bits are required to represent the decimal numbers in the range 0 to 999 using BCD codes?	1M	CO1	BL1
b)	Find the 2's complement of the number 01100100.	1M	CO1	BL2
c)	Express the function $Y = A + \bar{B}C$ in canonical POS.	1M	CO2	BL1
d)	Describe the importance of don't care conditions.	1M	CO2	BL1
e)	Distinguish between a decoder and a demultiplexer.	1M	CO3	BL1
f)	Give the truth table for half adder and write the expression for sum and carry.	1M	CO3	BL2
g)	Distinguish between combinational logic and sequential logic.	1M	CO4	BL1
h)	What are shift register counters?	1M	CO4	BL2
i)	Compare the Moore machine and Mealy machine.	1M	CO5	BL2
j)	Draw the diagram of Mealy type FSM for serial adder.	1M	CO5	BL1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	a) Explain the Binary codes with examples. b) Represent the decimal number 3452 in i) BCD ii) Excess-3	5M 5M	CO1	BL3
OR				
3	a) What is Hamming code? How is the Hamming code word tested and corrected? b) Determine the value of base x if $(211)_x = (152)_8$	7M 3M	CO1	BL4
4	a) Design the circuit by Using NAND gates $F = ABC' + DE + AB'D'$ b) Simplify and implement the following SOP function using NOR gates $F(A,B,C,D) = \sum m(0,1,4,5,10,11,14,15)$	5M 5M	CO2	BL5
OR				
5	Find the Minimized logic function using K-Maps. $F(A, B, C, D) = \sum m(1,3,5,8,9,11,15) + d(2,13)$. Implement the minimal SOP using NAND and NOR gates.	10M	CO2	BL3

6	a) How can a full adder be constructed with two half adders and one OR gate? b) How is carry look ahead adder faster than a ripple carry adder? Explain in detail with neat sketches.	5M 5M	CO3	BL3																										
OR																														
7	a) Design a 3:8 decoder using basic gates. b) Design a binary to gray code converter.	5M 5M	CO3	BL5																										
8	a) Realize a JK flip flop using SR flip flop. b) Draw the logic diagram for SR, JK, D&T flip flops.	5M 5M	CO4	BL5																										
OR																														
9	a) Draw 4-bit Ring Counter and explain the operation with Truth Table. b) Design a mod 7 asynchronous counter using JK flip-flop.	5M 5M	CO4	BL5																										
10	Design a sequential logic circuit of a 4-bit counter to start counting from 0000 to 1100 & this process should go on.	10M	CO5	BL5																										
OR																														
11	a) Explain merger chart methods of minimal convertible. b) Construct the compatibility graph and obtain the minimal cover table for the sequential machine described by the state table given.	5M 5M	CO5	BL3																										
	<table border="1" style="margin-left: 40px;"> <thead> <tr> <th rowspan="2">PS</th> <th colspan="2">NS,Z</th> </tr> <tr> <th>I=0</th> <th>I=1</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2,0</td> <td>3,1</td> </tr> <tr> <td>2</td> <td>1,0</td> <td>1,1</td> </tr> <tr> <td>3</td> <td>4,1</td> <td>4,1</td> </tr> <tr> <td>4</td> <td>3,1</td> <td>6,0</td> </tr> <tr> <td>5</td> <td>1,0</td> <td>1,1</td> </tr> <tr> <td>6</td> <td>7,0</td> <td>3,0</td> </tr> <tr> <td>7</td> <td>4,1</td> <td>4,1</td> </tr> </tbody> </table>	PS	NS,Z		I=0	I=1	1	2,0	3,1	2	1,0	1,1	3	4,1	4,1	4	3,1	6,0	5	1,0	1,1	6	7,0	3,0	7	4,1	4,1			
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