*R20 Regulation* *Subject code: 3P3DB*

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

## B.Tech III Semester Supplementary Examinations, June 2026

## DIGITAL LOGIC DESIGN

## *(ECE)*

***Maximum Marks: 70*** Date: 16.06.2026 Duration: 3 hours

**Note:** **1.This question paper contains two parts A and B.**
**2. Part A is compulsory which carries 20 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 (10X2M=20 Marks) | | Marks | CO | BTL |
|---|---|---|---|---|
| 1 | What is Gray code? | 2M | 1 | L1 |
| 2 | What is min term? | 2M | 1 | L1 |
| 3 | What are don't cares? | 2M | 2 | L1 |
| 4 | Write about 2X1 MUX. | 2M | 2 | L1 |
| 5 | Compare latch and flip flop. | 2M | 3 | L1 |
| 6 | Write the characteristic table of SR Flip flop. | 2M | 3 | L1 |
| 7 | Compare combinational and sequential circuits. | 2M | 4 | L1 |
| 8 | Define counter. | 2M | 4 | L1 |
| 9 | Define state machine. | 2M | 5 | L1 |
| 10 | Compare Mealy and Moore machines. | 2M | 5 | L1 |

Part-B

| Answer All the following questions. (5X10M=50Marks) | | Marks | CO | BTL |
|---|---|---|---|---|
| 11 | a) Convert the given Gray code number to equivalent binary 001001011110010.<br>b) Convert $(A0F9.0DC)_{16}$ to decimal, binary, octal. | 5M<br>5M | 1 | L2 |
| | OR | | | |
| 12 | Simplify the following Boolean expressions using the Boolean theorems.<br>(i) (A+B+C) (B'+C) + (A+D) (A'+C)<br>(ii) (A+B) (A+B') (A'+B) | 5M<br>5M | 1 | L2 |
| 13 | Minimize the following expressions using K-map and realize using NAND Gates. $f = \sum m(1, 3, 5, 8, 9, 11, 15) + d(2, 13)$. | 10M | 2 | L2 |
| | OR | | | |
| 14 | Design a combinational circuit to detect the decimal numbers 0,2,4,6 and 8 in a 4-bit XS-3 code input. | 10M | 2 | L2 |
| 15 | Draw and explain the operation of the Master Slave SR flip-flops with block diagram. | 10M | 3 | L2 |
| | OR | | | |

| | | | | |
|---|---|---|---|---|
| 16 | What is Flip-Flop? Explain excitation table of S-R flip-flop. | 10M | 3 | L2 |
| 17 | What is a shift register? Explain about the following modes of operations in a four bit shift register (i) shift right (ii) shift left (iii) bidirectional | 10M | 4 | L2 |
| | OR | | | |
| 18 | Design and explain a synchronous MOD-12 down-counter using T flip-flop. | 10M | 4 | L2 |
| 19 | a) What are the Moore and Mealy machines?<br>b) Explain the procedure for state minimization using the partition technique | 5M<br>5M | 5 | L2 |
| | OR | | | |
| 20 | Draw the diagram of Mealy type FSM and explain with an example. | 10M | 5 | L2 |