



R20 Regulation

Subject code: 3P4BB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Regular/Supplementary Examinations, September 2023

DIGITAL ELECTRONICS

(Electrical & Electronics Engineering)

Maximum Marks: 70

Date: 15.09.2023 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 which carries 10M.
 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)

- 1 What is the main advantage of performing subtraction by the compliment method?
- 2 Determine the value of base x if $(50)_x = (203)_4$.
- 3 Convert the given expression in canonical SOP form $Y = AC + AB + BC$.
- 4 What is a prime implicant?
- 5 Draw the logic diagram of a 1-bit comparator.
- 6 Differentiate a decoder from a Demultiplexer.
- 7 How does the JK FF differ from an SR FF in its basic equation?
- 8 Define Synchronous counter.
- 9 Differentiate Mealy and Moore machines.
- 10 Define state tables and state diagram.

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 A. Express the following numbers in sign magnitude 1's and 2's complement:

- (i) -56
- (ii) 107

(4M)

B. Perform each of the following decimal subtractions in 8-4-2-1 BCD using 9's complement method.

- (a) 79 - 26
- (b) 89 - 54

(6M)

OR

- 12 Generate 7-bit Hamming code for the given data bits.

- a) 1001 b) 1010

(10M)

- 13 Find a minimal SOP representation for
 $f(A,B,C,D,E) = \sum_m (1,4,6,10,20,22,24,26) + d(0,11,16,27)$ using K-map method. Draw the circuit of the minimal expression using only NAND. (10M)
- OR
- 14 A. Given $Y(A, B, C, D) = \prod_M (0, 1, 3, 5, 6, 7, 10, 14, 15)$, draw the K-map and obtain the simplified expression. Realize the minimum expression using basic gates. (5M)
- B. Prove by perfect induction
- (i) $A+AB=A$
- (ii) $A(A+B)=A$
- (iii) $A+A'B=A+B$
- (iv) $A(A'+B)=AB$ (5M)
- 15 A. Implement full adder using 2 Half-adders. (5M)
- B. Implement full subtractor in AOI logic. (5M)
- OR
- 16 Design & implement the conversion circuits for BCD to Excess – 3 code. (10M)
- 17 Explain the operation of universal shift register with neat block diagram. (10M)
- OR
- 18 Design and explain the working of a 3-bit Up/Down ripple counter. (10M)
- 19 Design a synchronous sequential circuit having a single input and single output. The output is to zero unless an input sequence 0101 is received. (10M)
- OR
- 20 Explain Mealy and Moore models of finite state machine in details. (10M)