CBCS SCHEME

USN | | | | | | | | | | |

17EC34

Third Semester B.E. Degree Examination, July/August 2021
Digital Electronics

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions.***

1 a. Define the following with an example: (i) Sum of products (ii) Product of sums (iii) Canonical sum of products (iv) Canonical product of sums (v) Minterm. **(10 Marks)**

b. Obtain the minimal logical expression for the given minterm using K-map.
$T = f(a,b,c,d,e) = \sum(0,2,8,10,16,18,24,26)$ **(05 Marks)**

c. Simplify the following maxterm expression using K-map:
A= f(w, x, y, z) = π(2, 3, 8, 9, 10, 11, 12, 13, 14, 15) **(05 Marks)**

2 a. Simplify the following using Quine-McClusky minimization technique and also verify the same.
$D = f(a,b,c,d) = \sum(0,1,2,3,6,7,8,9,14,15)$ **(10 Marks)**

b. Express the following SOP equations in the form of minterms:
(i) $G = f(A,B,C) = A'BC + A'B'C + ABC$
(ii) $P = f(w,x,y,z) = wxyz' + wx'yz' + w'xyz' + w'x'yz'$ **(04 Marks)**

c. Place the following equations into proper canonical form:
(i) $P = f(a,b,c) = ab' + ac' + bc$
(ii) $T = f(a,b,c) = (a+b')(b'+c)$ **(06 Marks)**

3 a. Define : (i) Subtractors (ii) Binary comparators (iii) Full Adder **(06 Marks)**

b. Realize the following using 745151 8 : 1 MUX :
(i) $F = f(x,y,z) = \sum(1,2,4,5,7)$
(ii) $T = f(w,x,y,z) = \sum(0,1,2,4,5,7,8,9,12,13)$ **(06 Marks)**

c. Write the truth table of two-bit magnitude comparator. Write the K-map for each. Output of two-bit magnitude comparator and the resulting equation. **(08 Marks)**

4 a. Design a 4-to-16 Decoder using two 74XX138 decoders. **(05 Marks)**

b. With a neat diagram, explain carry look ahead adder. **(10 Marks)**

c. Distinguish between decoder and encoder. Implement full adder using IC74153. **(05 Marks)**

5 a. Explain Master Slave JK flip-flop with the help of timing diagram and waveforms. **(08 Marks)**

b. Find the characteristic equation of T and SR flip-flops with the help of functional tables. **(06 Marks)**

c. With a neat diagram, explain positive edge triggered D-flip flop and explain for different input conditions. **(06 Marks)**

6 a. Explain the operation of switch debouncer built using SR latch with the help of waveforms. **(04 Marks)**
b. What is a flip-flop? Discuss the working principle of Master Slave SR f/f with the help of timing diagram and truth table. **(08 Marks)**
c. Define : (i) Propagation delay (ii) Minimum pulse width (iii) Setup time and (iv) Hold time **(08 Marks)**

7 a. Design a mod-6 synchronous counter using clocked D flip flop. **(08 Marks)**
b. Explain SIPO and SISO using flip flop. **(06 Marks)**
c. Design synchronous mod-6 counter using clocked JK flip flops. **(06 Marks)**

8 a. Explain mod-8 and mod-7 twisted ring counter with a neat diagram and counting sequence. **(08 Marks)**
b. Explain 4-bit binary ripple counter with logic diagram, timing diagram and counting sequence. **(08 Marks)**
c. Explain mod-4 ring counter with logic diagram and counting sequence. **(04 Marks)**

9 a. Explain Kealy and Moore sequential circuit model with neat diagrams. **(06 Marks)**
b. Define : (i) Input variable (ii) Output variable (iii) State variable and (iv) State. **(04 Marks)**
c. Give Mealy state notation, Moore circuit notation and Mealy and Moore mixed circuit diagram notation for JK flip flop. **(10 Marks)**

10 a. Give the steps for analyzing the function of a sequential circuit. **(04 Marks)**
b. Explain JK flip flop characteristic table excitation table with K-maps for excitation variables. **(10 Marks)**
c. Explain the excitation realization for T and D-flip-flops. **(06 Marks)**

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