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Question Paper Code: 53402

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Third Semester

Electronics and Communication Engineering

15UEC302 - DIGITAL ELECTRONICS AND DESIGN

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

- Which of the following expressions is in the sum-of-products (SOP) form? CO1- U
(a) $(A + B)(C + D)$ (b) $(A)B(CD)$ (c) $AB(CD)$ (d) $AB + CD$
- How many 3-line-to-8-line decoders are required for a 1-of-32 decoder? CO2- R
(a) 1 (b) 2 (c) 4 (d) 8
- A ripple counter's speed is limited by the propagation delay of CO3- R
(a) Each flip-flop (b) All flip-flops and gates
(c) The flip-flops only with gates (d) Only circuit gates
- The time sequence of inputs, outputs, and flip-flop states can be enumerated in a CO4- R
(a) Transition table (b) Truth table (c) Characteristic table (d) None of these
- PALs tend to execute _____ logic. CO5-R
(a) SAP (b) SOP (c) PLA (d) SPD

PART – B (5 x 3= 15 Marks)

6. Simplify the following using De Morgan's theorem $[((AB)'C)' D]'$. CO1- Ana
7. What is binary decoder? CO2- R
8. Define skew and clock skew. CO3- R
9. Give the comparison between synchronous and asynchronous counters. CO4- R
10. What is programmable logic array? How it differs from ROM? CO5- R

PART – C (5 x 16= 80 Marks)

11. (a) Simplify the following function using K – map, CO1- App (16)
 $Y = A'B'C+ABC'D'+A'BD+ABCD'$ and implement the function using logic gates.

Or

(b) Minimize the given Boolean function using Quine McCluskey CO1- App (16)
Method
 $F(A,B,C,D) = \sum (0, 2, 3, 6, 7, 8, 10, 12, 13)$
12. (a) Design and implement the conversion circuits for BCD to CO2- App (16)
Excess – 3 code.

Or

(b) (i) Draw the logic diagram of a 2-bit by 2-bit binary multiplier CO2- U (8)
and explain its operation.
(ii) Realize $F(w, x, y, z) = \sum (1,3,4,11,12,13,14,15)$ using 8 to 1 CO2- App (8)
Mux.
13. (a) Design an asynchronous BCD ripple counter using JK flip – flop. CO3- App (16)

Or

(b) Design a 4 bit Synchronous Binary counter and explain its CO3- App (16)
operation.
14. (a) (i) Design a sequential circuit with two D flip-flops A and B and CO4- Ana (8)
an input x. when $x=0$ the state of the circuit remains the same.
When the circuit goes through the state transitions from 00 to 01
to 11 to 10 back to 00 and repeats.

(ii) Explain the static and dynamic hazards in combinational logic circuits with an example. CO4- U (8)

Or

(b) Design a primitive flow table for a circuit with two inputs x_1 and x_2 and two outputs z_1 and z_2 that satisfies the following four conditions. CO4- Ana (16)

(i) When $x_1x_2 = 00$ output $z_1z_2 = 00$.

(ii) When $x_1 = 1$ and x_2 changes from 0 to 1, the output $z_1z_2 = 01$.

(iii) When $x_2 = 1$ and x_1 changes from 0 to 1, the output $z_1z_2 = 10$.

(iv) Otherwise the output does not change.

15. (a) Implement the binary to excess-3 code converter using ROM. CO5- App (16)

Or

(b) (i) Implement Boolean function with PLA: CO5- App (10)

$F_1(A, B, C) = \sum(0, 2, 3, 4)$ and $F_2(A, B, C) = \sum(1, 5, 6, 7)$

(ii) Compare the static and dynamic RAMs. CO5- U (6)

