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Question Paper Code: R2804

B.E./B.Tech. DEGREE EXAMINATION, MAY 2024

Second Semester

Information technology

R21UIT204 - DIGITAL PRINCIPLES & SYSTEM DESIGN

(Regulations R2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. What is the base conversion of decimal number for the following Binary number: 1101001? CO2-App
(a) 102 (b) 105 (c) 106 (d) 107
2. What is the output of that $A + \bar{A}B =$ CO2-App
(a) A+B (b) B+A (c) A+A (d) A+B
3. The result obtained on binary multiplication of $1010 * 1100$ is _____ CO2-App
(a) 1111000 (b) 1111001 (c) 1111000 (d) 1111001
4. The Simplified expression of full subtractor Borrow is _____ CO1-U
(a) $B_{out} = \bar{A}B_{in} + \bar{A}B + BB_{in}$ (b) $B_{out} = BA_{in} + BB + BA_{in}$
(c) $B_{out} = AB_{in} + BA + AA_{in}$ (d) $AB_{in} + BB_{in} + BB_{in}$
5. If the number of n selected input lines is equal to 2^m then it requires _____ selected lines CO1-U
(a) n (b) m (c) 2 (d) 2n
6. For re programmability, PLDs use _____ CO1-U
(a) PROM (b) EPROM (a) PROM (d) De Multiplexer
7. The functional difference between SR flip-flop and JK flip-flop is that CO1-U
(a) JK flip-flop is faster than SR flip-flop (b) JK flip-flop has a feedback path
(c) JK flip-flop accepts both inputs 1 (d) JK flip-flop does not require external clock

8. A counter circuit is usually constructed of _____ CO1-U
 (a) A number of latches connected in cascade form
 (b) A number of NAND gates connected in cascade form
 (c) A number of flip-flops connected in cascade
 (d) A number of NOR gates connected in cascade form
9. A condition occurs when an asynchronous sequential circuit changes two or more binary states variable is _____. CO1-U
 (a) deadlock condition (b) Running condition (c) Race condition (d) None
10. The race in which stable state depends on order is called CO1-U
 (a) critical race (b) identical race (c) non critical race (d) defined race

PART – B (5 x 2= 10Marks)

11. Convert the following Binary numbers into Decimal numbers: CO2-App
 (i) 110101_2
 (ii) 1100.1011_2
12. Draw the truth table for half-adder circuit. CO2-App
13. Convert gray code 101011 into its binary equivalent CO2-App
14. Explain the Latch function in Digital Circuit. CO2-App
15. Compare Synchronous sequential circuits and Asynchronous sequential circuits CO2-App

PART – C (5 x 16= 80Marks)

16. (a) Simplify the following function using tabulation method. Also CO2-App (16)
 Implement it using simple logic gates
 $F(w,x,y,z) = \sum m(2,3,12,13,14,15)$
 Or
- (b) Simplify the following Boolean Expression: CO2-App (16)
- i) $Y = AB + A(B + C) + B(B + C)$ (4)
- ii) $Y = \overline{AB}(\overline{A} + B)(\overline{B} + B)$ (4)
- iii) $\overline{Y} = \overline{A\overline{C}} + \overline{B\overline{C}} + B\overline{C} + ABC$ (4)
- iv) $\overline{Y} = A + \overline{AB} + \overline{A\overline{B}C} + \overline{A\overline{B}C}D$ (4)
17. (a) Design a circuit for BCD addition CO2-App (16)
 Or
 (b) Design a logic circuit to convert BCD to gray code. CO2-App (16)

18. (a) Realize $F(w,x,y,z)=\sum(1,4,6,7,8,9,10,11)$ using 4 to 1 MUX. CO2-App (16)
Or
(b) Design a switching circuit that converts a 4 bit binary code into a 4 bit Gray code using ROM array CO2-App (16)
19. (a) Explain the operation of JK Flip-flops and SR Flip flops with suitable diagrams. CO2-App (16)
Or
(b) Design divide by 6 counter using T-flip-flops. Write state table and reduce the expression using K-map CO2-App (16)
20. (a) Design an asynchronous sequential circuit with two inputs X and Y and with one output Z. Whenever Y is 1, input X is transferred to Z. When Y is 0, the output does not change for any change in X. CO2-App (16)
Or
(b) Design an asynchronous sequential circuit with two inputs x_1 and x_2 and one output Z. The output $Z=1$ if x_1 changes from 0 to 1, $Z=0$ if x_2 changes from 0 to 1, and $Z=0$ otherwise. Realize the circuit using D flip-flops CO2-App (16)

