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**Question Paper Code: 41362**

B.E. / B.Tech. DEGREE EXAMINATION, NOVEMBER 2015.

Third Semester

Instrumentation and Control Engineering

14UIC302 – DIGITAL LOGIC CIRCUITS AND DESIGN

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 1 = 10 Marks)

- The Hexadecimal equivalent of a decimal number 48 is  
(a) 2B                      (b) 2E                      (c) 2F                      (d) F2
- Let A & B are Boolean variables and if  $A = 1$  &  $\overline{A+B} = 0$ . What is B?  
(a) 0                      (b) 1                      (c) either 0 or 1                      (d) none of the above
- What is ROM?  
(a) repeat on memory                      (b) read on memory  
(c) read only memory                      (d) repeat only memory
- Write the Boolean equation for the SUM output of a full adder.  
(a)  $A \oplus B \oplus C$                       (b)  $A + B + C$                       (c)  $\overline{A} \oplus \overline{B} \oplus \overline{C}$                       (d)  $\overline{A} + \overline{B} + \overline{C}$
- Select the correct characteristic equation of a SR flipflop.  
(a)  $Q_{n+1} = \overline{S} + RQ_n$                       (b)  $Q_{n+1} = S + \overline{R}Q_n$   
(c)  $Q_{n+1} = S + RQ_n$                       (d) none of the above

6. How many flipflops are required to build a binary counter that counts from 0 to 1023?  
 (a) 12                      (b) 20                      (c) 50                      (d) 10
7. The next state variables in asynchronous sequential circuits are called  
 (a) secondary variables                      (b) excitation variables  
 (c) primary variables                      (d) short term memory
8. Which element is used to avoid static hazard?  
 (a) SR Latch                      (b) MUX                      (c) Decoder                      (d) none of the above
9. Which of the following logic family has the shortest propagation delay?  
 (a) CMOS                      (b) NMOS                      (c) ECL                      (d) 74Sxx
10. In VHDL, the mode of a port does not define:  
 (a) an input                      (b) an output                      (c) the type of the bit                      (d) none of the above

PART - B (5 x 2 = 10 Marks)

11. State Demorgan's Theorem.
12. Draw the logic diagram of half-subtractor.
13. Compare combinational and sequential circuits
14. What do you mean by races and cycles?
15. List the advantages of CMOS logic.

PART - C (5 x 16 = 80 Marks)

16. (a) Reduce the following functions using K-map techniques.  
 (i)  $f(A, B, C, D) = \sum m(0, 1, 2, 3, 5, 7, 8, 9, 11, 14)$  (8)  
 (ii)  $f(A, B, C, D) = \prod M(0, 3, 4, 7, 8, 10, 12, 14) + d(2, 6)$  (8)
- Or
- (b) Use Quine–Mccluskey method and simplify the following function,  
 $f(a, b, c, d) = \sum m(0, 1, 2, 3, 8, 9)$ . (16)
17. (a) Design and draw 4 bit binary to gray code converter and explain. (16)

Or

- (b) (i) What is PAL? How it differs from PROM and PLA? (6)  
(ii) Elaborate the typical ROM internal organization with necessary diagrams. (10)
18. (a) (i) Write down the circuit diagram, characteristic equation and truth table of the JK Flipflop. (6)  
(ii) Explain the principle of operation of any one type of four bit shift register with neat diagram. (10)

Or

- (b) Construct a decade ripple counter using flip flops and explain. (16)
19. (a) Draw the fundamental mode asynchronous circuit and explain in detail. (16)

Or

- (b) What is Hazard? How you can eliminate it? Explain with suitable example. (16)
20. (a) Explain TTL logic in detail. Also implement any one gate using TTL logic with neat sketch. (16)

Or

- (b) What is VHDL? Design a full adder circuit using VHDL code. (16)
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