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Reg. No. : | | | | | | | | | | |

Question Paper Code: 93402

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Third Semester

Electronics and Communication Engineering

19UEC302 - Digital Electronics and Design

(Regulation 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The 2's complement representation of –17 is CO1- U

(a) 01110 (b)01111 (c)11110 (d)10001

2. In a combinational circuit, the output at any time depends only on the _____ at that time. CO2- U

(a) Voltage (b) Intermediate values (c) Input values (d) Clock pulses

3. Latches constructed with NOR and NAND gates tend to remain in the latched condition due to which configuration feature? CO3- U

(a) Low input voltages (b) Synchronous operation

(c) Gate impedance (d) Cross coupling

4. What is/are the crucial function/s of memory elements used in the sequential circuits? CO4- U

(a) Storage of binary information (b) Specify the state of sequential

(c) Both a & b (d) None of the above

5. Which one of the following has capability to store data in extremely high densities? CO5- R

(a) Register (b) Capacitor (c) Semiconductor (d) Flip-Flop

PART – B (5 x 3= 15 Marks)

6. Perform the following code conversions: $(AB2)_{16} \rightarrow (?)_2 \rightarrow (?)_8 \rightarrow (?)_{10}$. CO2 App

7. Implement the half adder using OR gate. CO2 App

8. Compare sequential and combinational circuit. CO3 U

9. Classify static 1 and static 0 hazards. CO4 U

10. How many programmable gates are needed for PROM?. CO5 U

PART – C (5 x 16= 80 Marks)

11. (a) (i) Subtract $(1\ 1\ 1\ 0\ 0\ 1)_2$ from $(1\ 0\ 1\ 0\ 1\ 1)_2$ using 2's complement method. CO1- App (16)
(ii) Express $(-0.75)_{10}$ in IEEE single precision floating point representation.
(iii) Find the dual expression of the Boolean expression (A.B+A.C+B.C).
(iv). Convert decimal number 22.64 to hexadecimal number.

Or

(b) Find a minimal sum–of–products for the Boolean expression $f(A,B,C,D) = \sum m(0,2,4,7,8,10,11,13,14)$ using tabulation method. CO1- App (16)

12. (a) Design a 4-bit parallel adder/subtractor and explain the operation with logic diagram. CO2- App (16)

Or

(b) Implement the Boolean function using 8:1 multiplexer $f(A,B,C,D) = \sum m(1,3,4,11,12,13,14,15)$. CO2- App (16)

13. (a) Design S-R flipflop using T flipflop. CO3- App (16)

Or

(b) How should a J-K flipflop be connected to function as a divide-by-2-element? Justify your answers. CO3- App (16)

14. (a) Design an asynchronous sequential circuit with two inputs x1 and x2 and one output z. Initially, both inputs are equal to zero. When x1 or x2 becomes '1',the output z becomes 1.When the second input also becomes 1,the output changes to 0.The output stays at 0 until the circuit goes back to the initial state. CO4- App (16)

Or

(b) Design a hazard free switching circuits with relevant examples. CO4- App (16)

15. (a) Design a Binary-to-Gray converter similar to basic ROM Structure CO5- App (16)

Or

(b) Implement the following Boolean function using PAL CO5- App (16)

$W(A,B,C,D) = \sum m(0,2,6,7,8,9,12,13)$,

$X(A,B,C,D) = \sum m(0,2,6,7,8,9,12,13,14)$

$Y(A,B,C,D) = \sum m(2,3,8,9,10,12,13)$,

$Z(A,B,C,D) = \sum m(1,3,4,6,9,12,14)$

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