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Class :- F.Y.B.Sc.[Comp. Sci.]
Department :- Electronic Science
Subject : - Fundamentals of Digital Electronics
Paper : II

QUESTION BANK

Q.   Answer in short [1 mark]

1.   Define Minterms and maxterms.
2.   What is priority encoder?
3.   Write the 1's complement of $(001010)_2$
4.   Write the 2's complement of $(1011010)_2$.
5.   What is minterm and maxterm?
6.   Explain octal to binary encoder.
7.   What is decoder?
8.   Find the number of select lines required in 64 : 1 multiplexer.
9.   What is multiplexer ?
10.   What is de-multiplexer ?
11.   Write disadvantages of half adder.

Q.   Answer in short [2 marks]

1.   Give symbol, Boolean Equation and truth table for NAND, NOR gates.
2.   Give symbol, Boolean Equation and truth table for Ex- OR and Ex-NOR gates.
3.   Define : i) Positive Logic ii) Negative Logic
4.   What is meant by LSB and MSB.
5.   What is weighted number system? Give any one example of such number system.
6.   List non weighted number systems.
7.   What is the difference between BCD and Binary Code?
8.   Give the BCD and Binary equivalent of $(15)_{10}$.
9.   Specify the number of variables eliminated for i) Pair ii) Quad for 3 variable k-map.
10.   Specify the number of variables eliminated for   i) Quad ii) Octet for 4 variable k-map.
11.   Perform : $(01011)_2 - (01010)_2$. using rules of binary subtraction.
12.   Perform : $(1010)_2 + (0101)_2$ using rules of binary addition.
13.   In half adder circuit, Ex-OR gate is used to get the SUM and AND gate is used to get carry. Justify.
14.   Write applications of full adder.
15.   Write applications of half adder.

16.   Write disadvantages of half subtractor.
17.   Give difference between half adder and full adder.
18.   Write the advantages of multiplexer.
19.   What is the need of multiplexer?
20.   What are the types of multiplexer ?
21.   Write the applications of de-multiplexer.
22.   What are the types of de-multiplexer ?
23.   Write the types of code converter.
24.   What is encoding? Write the types of Encoder.
25.   Write the applications of decoder.
26.   What is the difference between decoder and de-multiplexer.
27.   Write Boolean laws : i) Commutative law   ii) Associative law
28.   Write Boolean laws : i) Distributive Law   ii) Inversion Law
29.   Write Boolean Laws : i) AND Law ii) OR Law   iii) Inversion Law
30.   Simplify Y= ABC + AB using rules of Boolean Algebra.
31.   Give the base/ radix for following number systems :
        i) Binary ii) Octal iii) Hexadecimal iv) Decimal

Q.   Long Answer [4 marks]

1.   Describe the number system : Octal, Hexadecimal, Binary , Decimal.
2.   Convert :
        (i) $(28.47)_{10} = (?)_2$ (ii) $(11010.010)2 = (?)_{10}$
3.   Convert :
        (i) $(43.4)_{10} = (?)_{16}$ (ii) $(A2.2)16 = (?)_{10}$
4.   Convert :
        (i) $(542)_8 = (?)_2$ (ii) $(0101110)2 = (?)_{10}$
5.   Convert :
        (i) $(1023)_{10} = (?)_8$ (ii) $(423)8 = (?)_{10}$
6.   Convert :
        (i) $(FA.28)_{16} = (?)_2$ (ii) $(01111101)_2 = (?)_{16}$
7.   Convert :
        (i) $(42.45)_8 = (?)_{16}$ (ii) $(F2.A8)_{16} = (?)_8$
8.   Construct BCS and Excesss 3 code for decimal number 0 to 9.
9.   Perform the following :
        i) $(10001)_{gray}$ to binary   ii) $(10101)_2$ to gray.
10.   Convert :
        i) $(250)_{10}$ to BCD.   ii) $(1011 0110)_{BCD}$ to decimal.
11.   Convert :
        i) $(1101)_2$ to excess-3 code   ii) $(1010 1101)_{BCD}$ to Excess-3.
12.   Give symbol, Boolean Equation and truth table for AND, OR and NOT gates.
13.   Draw internal IC diagrams for 7408,7402.
14.   Draw internal IC diagrams for 7432,7400.
15.   Draw internal IC diagrams for 7404,7486.
16.   Draw the symbol of universal gates with their truth table and Boolean equations.
17.   Construct AND and NOT gates using only NAND gate.
18.   Construct OR and NOT gates using only NAND gate.
19.   Construct OR and NOT gates using only NOR gate.
20.   Construct AND and NOT gates using only NAND gate.
21.   Prove the following : (A+B)(A+C) = A+BC

22.   Simplify the following expression using Boolean Algebra :

$$Y = (\overline{\overline{A} + B}).(\overline{\overline{C} + D})$$

23 .   Simplify following expression using DeMorgan's Theorems :

$$Y = \overline{(\overline{A.B} + \overline{A} + AB)}$$

24.   Simplify the logic expression : $\overline{A}\ \overline{B}\ \overline{C} + \overline{A}\ B\ \overline{C} + A\ \overline{B}\ \overline{C} + A\ B\ \overline{C}$ using Boolean laws.

25.   Draw the logic circuit using the basic gates to obtain the following output.
            Y= AB +BC+ AC

26.   Draw the logic circuit using the basic gates to obtain the following output.
            Y= A$\overline{B}$C + C$\overline{D}$ + B$\overline{D}$A.

27.   Simplify the following Boolean equation and draw the logic diagram and truth table :
            Y = ABC + AB$\overline{C}$ +BC

28.   Define Pair, quad and an octet.

29.   Simplify the following expression using K-map:

$$Y = \overline{A}\ \overline{B}\ \overline{C} + \overline{A}B\overline{C} + AB\ \overline{C} + A\ \overline{B}\ \overline{C} + \overline{A}BC + ABC$$

30.   Subtract the following using 1's complement method : $(23)_{10}$ - $(10)_{10.}$

31.   Subtract the following using 2's complement method : $(10)_{10} - (15)_{10}$.

32.   Perform BCD addition : $(51)_{BCD} + (51)_{BCD}$.

33.   Describe Half adder with the help of logic diagram and truth table.

34.   Describe Half subtractor with the help of logic diagram and truth table.

Q.   Long Answer [6 marks]

1.   Explain the working of half adder circuit with logic diagram and truth table using k-map.
2.   Explain the working of half subtractor circuit with logic diagram and truth table using k-map.
3.   Explain 2-bit comparator.
4.   Explain the working of 2:1 Multiplexer with logic diagram.
5.   Explain the working of 1:2 Demultiplexer with logic diagram.
6.   Explain 2 to 4 line decoder.
7.   Implement the following Boolean function using 3 : 8 decoder and external gates ,
            f(A,B,C)=Σ(2,4,5,7).
8.   Give symbol, Boolean Equation and truth table for 4 input AND gate.
9.   Give symbol, Boolean Equation and truth table for 4 input OR gate.
10.   Give symbol, Boolean Equation and truth table for 4 input NAND gate.
11.   Give symbol, Boolean Equation and truth table for 4 input NOR gate.
12.   Construct Ex- OR gate using only NOR gate.
13.   Construct Ex-OR gate using only NAND gate.
            i) A+ AB = A
            ii) A+ $\overline{A}$ B= A+B
14.   Construct Ex- NOR gate using only NOR gate.
15.   Construct Ex- NOR gate using only NAND gate.
16.   Prove the following :
17.   State and prove DeMorgan's Theorems.
18.   Simplify : (A + B+ C)(A+$\overline{B}$+C), Draw simplified logic diagram.
19.   Convert the expression into standard Canonical SOP form
            Y= AB + BC + AC + A

20. Convert the canonical expression into standard SOP form
$Y = \overline{B}C + CA + C + A\overline{B}$

21. Convert the canonical expression into standard POS form
$Y = (\overline{A}+C)(B+C)(A)(A+B)$.

22. What is Karnaugh map ? Give the layout of 4 variable k-map. Simplify following expression using K-map:
$Y = \overline{A}\,\overline{B}\,\overline{C}\,\overline{D} + A\,\overline{B}\,\overline{C}\,D + A\,B\,\overline{C}\,\overline{D} + \overline{A}\,B\,\overline{C}\,\overline{D} + A\,\overline{B}\,C\,\overline{D} + A\,B\,C\,\overline{D}$

23. Simplify the expression given below using k-map : $Y = \Sigma m(2, 3, 5) + d(6,7)$.

24. Subtract the following using 1's complement method : $(11)_{10} - (15)_{10}$.

25. Subtract the following using 2's complement method : $(21)_{10} - (15)_{10}$.

26. Describe Full adder with the help of logic diagram and truth table.

27. Describe full subtractor with the help of logic diagram and truth table.

28. Explain the working of full adder circuit with logic diagram and truth table using k-map.

29. Explain the working of full subtractor circuit with logic diagram and truth table using k-map.

30. Draw the diagram of 4 bit universal adder subtractor circuit and explain its working.

31. Explain block diagram of ALU.

32. Explain the working of 4:1 Multiplexer with logic diagram.

33. Explain with logic diagram, working of decimal to binary encoder.

34. Explain with logic diagram, working of hexadecimal to binary encoder.

35. Explain with logic diagram, working of BCD to decimal encoder.

36. Explain the working of 1:4 Demultiplexer with logic diagram.

Q. Long answer [12 marks]

1. Explain BCD to 7 – segment display code converter using common anode .

2. Explain the working of 16:1 Multiplexer with logic diagram.

3. Using k-map, simplify following Boolean expression :

$Y = \overline{A}\,B\,\overline{C}\,D + A\,\overline{B}\,\overline{C}\,D + A\,B\,\overline{C}\,D + \overline{A}\,B\,C\,D + \overline{A}\,\overline{B}\,\overline{C}\,\overline{D} + \overline{A}\,B\,C\,\overline{D} + \overline{A}\,\overline{B}\,C\,\overline{D}$

   Draw the logic diagram for simplified expression. Write it's truth table.

4. Explain the working of 1:16 De-multiplexer with logic diagram.

5. Explain the working of 8:1 Multiplexer with logic diagram.

6. Explain the working of 1:8 de-mltiplexer with logic diagram.