

Roll No. _____

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1. (i) Write the expression and draw the truth table with basic gate diagram for the following : $12+3=15$

- (a) NOR gate
- (b) NAND gate
- (c) XOR gate
- (d) XNOR gate

(ii) Which of the above is a 'universal' gate? Why?

2. (a) Define the following with respect to Boolean Algebra : Minterm, Maxterm, POS Expression, SOP expression, Combinational logic. 5

(b) Draw the Truth table for the following expression :

$$y = \bar{A} \bar{B} C + A \bar{B} C = \bar{A} B C$$

From the truth table, construct the POS expression for y. 5

(c) State and explain the De Morgan's Theorem. 5

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3. (a) Explain 'don't care' state in K-Map with an example. 5
(b) Minimize the following Boolean function : 10
 $F(A,B,C,D)=\Sigma m(0, 1, 2, 5, 7, 8, 9, 10, 13, 15)$
4. Differentiate between the following with the help of examples : $5+5+5=15$
- (i) Decoder and Encoder
 - (ii) Half Adder and Full-Adder
 - (iii) ROM and PROM
5. Draw the schematic diagram of a hard Disk Drive/Hard Disk setup. Discuss its method of working. Explain : Track, Sector, Cylindering of Information, Seek Time, latency Time. <https://www.mgkvponline.com>
What do you understand by 'Fragmentation of Disk'? 15

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6. What is 'Race around' condition? Draw the schematic diagram of J-K Master Slave Flip Flop, as a solution to Race-Around condition, Explain its working. 15
7. (a) What is the difference between Synchronous and Asynchronous Counter? Give example of each. 5
(b) Draw the Block diagram for 03 Bit Binary counter. Explain its working with timing diagram. 10
8. What is the function of a shift Register? Explain its method of working with diagram. What are the different modes in which a Shift Register can operate? Discuss. 15
9. Write a short note on : $71 \times 2 = 15$
- (a) Associative Memory
 - (b) Cache Memory,