

Roll No. _____

22/5059**B.C.A. (Second Semester)****Examination, 2022****Second Paper****(Digital Electronics & Computer Organization)***Time : Three Hours / [Maximum Marks : 75*

Note : Attempt any **five** questions. **All** questions carry equal marks. The answers to short questions should not exceed **200** words and the answers to long answer type questions should not exceed **500** words.

P.T.O.**22/5059**

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

3. (a) Explain 'don't care' state in K-Map with an example. 5
- (b) Minimize the following Boolean function : 10
- $$F(A, B, C, D) = \sum m(0, 1, 2, 5, 7, 8, 9, 10, 13, 15)$$
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

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 : 7! x 2 = 15
- (a) Associative Memory
 - (b) Cache Memory