

**End Semester Examination of Semester-I, 2019**

**Subject : BCA**

**Paper : BCA-103**

**(Digital Electronics)**

**Full Marks : 70**

**Time : 3 Hrs**

*The figures in the margin indicate the marks corresponding to the question*

*Candidates are requested to give their answers in their own word as far as practicable.*

*Illustrate the answers wherever necessary.*

**Group A**

1. Answer any five out of eight questions: 2X5=10

- i) Show that  $A\bar{B} + (\bar{A} + B)C = \overline{A.B.C}$
- ii) What is the number of flip-flop required for a MOD-10 ring counter?
- iii) Write the differences between analog and digital system.
- iv) What are the utilities of 'preset' and 'clear' terminals of a F/F?
- v) What are the main differences between decoder and demultiplexer?
- vi) What is the data and address lines of 4 KB RAM?

- vii) What do you mean by POS & SOP?  
viii) Why CMOS is more powerful than TTL?

**Group B**

Answer any five out of seven questions : 5×4=20

2. Using K-Map method, minimize the following expression:  
 $F(a, b, c, d) = \sum m(1, 5, 6, 12, 13, 14) + \sum d(2, 4)$   
Implement Ex-OR gate using minimum no. of NAND and NOR gates. 2+2+4
3. Design a circuit which has 8-bit input, 8-bit output and a control signal. When control signal is 0, then "8 bit input = 8-bit output" and when control signal is 1, then "8-bit output will be the complement of 8-bit input".
4.  $A = 10101100$ ,  $B = 10111101$ , construct a circuit which add "A" & "B" using all F.A.
5. Design a 8×1 Mux using two 4 : 1 Mux and one OR gate?
6. In what way is a BCD adder different from a binary adder?  
What are code converters? 2+2
7. Draw the following ckt using NAND gate only :  
a)  $xy + \bar{x}\bar{y} + \bar{x}y$   
b)  $(x + y)(\overline{x + y})(\bar{x} + \bar{y})$  2+2
8. What do you mean by latch? Draw a NOR latch and explain its truth table. 1+3

Group C

Answer any four out of six questions:

10x4=40

9. i) Draw a 4-bit adder-subtractor circuit and explain it with proper example.
- ii) Write the differences between dual and complement.
- iii) Find the  $r$ 's and  $(r - 1)$ 's complement of  $(735)_8$ .  
4+3+3
10. i) If  $X$  and  $Y$  are two binary numbers,  $X$  is 1's complement of  $Y$  and hexadecimal equivalent of  $X$  is AC. Then find  $(X + Y)$ ,  $(X - Y)$  &  $(X * Y)$ .
- ii) Show that  $(A \oplus B) \odot C = A \oplus (B \odot C)$
- iii) Draw and explain 8x1 Mux using two 4x1 Mux and one 2x1 Mux.  
 $4\frac{1}{2} + 2\frac{1}{2} + 3$
11. i) Explain with a neat diagram, working principal of Master-slave J-K F/F.
- ii) Draw and explain 4-bit ripple counter. 6+4
12. a) What is comparator? Explain about 2-bit Magnitude comparator with suitable logic diagram.
- b) What are Enable inputs? Drawn and explain (circuit diagram) a full subtractor using Decoder. (2+3)+(1+4)
13. What is Code Converter? Design and develop the BCD to EX-3 Code Converter and draw the circuit. What is weighted code?  
2+6+2

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14. What are the functions of Counter? What is modulus Counter? Design a mod-10 synchronous counter and explain its truth table? 1+1+8
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