End Semester Examination of Semester–I, 2018

Subject : BCA
Paper : BCA–103
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) What is fan-in and fan-out?

   ii) Write the merits and demerits of DTL.

   iii) Differentiate decoder and de-multiplexer.

   iv) What is the number of F/F required for a irregular MOD-8 ring counter?

   v) Write the application of adder-subtractor circuit.

   vi) Why base-2 number system is used in digital computer?

   vii) Why compliment is used in number system?

   viii) How the bipolar RAM cell is different from MOSFET RAM Cell?

Group B

Answer **any five** out of seven questions : 5X4=20

2. i) Differentiate weighted and non-weighted code.
   ii) Consider the Boolean expression AB + CD, implement using minimum number of NAND gates. 2+2
3. What is race condition and how it is resolved?
4. For a 2-bit comparator, draw its truth table, circuit and write its expression.
5. 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 compliment of 8-bit input".
6. Giving the logic expression $ABC + B\overline{C}D + \overline{A}BC$. Make a truth table. Simplify using K-map method. Draw the circuits using NAND gates. 1+2+1
7. Draw a Octal to grey code converter. Also draw the K-map and truth table and write the Boolean expression.
8. Draw and explain down, 4-bit ripple counter.

Group C

Answer **any four** out of six questions: 10X4=40

9. i) Explain with a neat diagram working of Master-Slave J-K flip-flop.

ii) Draw the circuit using 2x1 mux and 8x1 for f(x, y, z) = $\Sigma m(0, 3, 5, 7)$. 6+4

10. i) Write the difference between latch and flip-flop.

ii) Show that $(A \oplus B) \odot C = A \oplus (B \odot C)$.

iii) Simplify the Boolean expression

f(A, B, C, D) = $A + \overline{A}B + \overline{A+B}.C + \overline{A+B+C}.D$ and also draw the circuit using minimum number of 2 input OR gates. 3+3+4

11. i) If X and Y are two binary numbers, X is 1's compliment of Y and hexadecimal equivalent of X is AC. Then find X+Y, X–Y & X*Y. 1.5x3=4.5

ii) Which gates are known as universal gates and why they are named so? 2.5

iii) Draw the circuit diagram of binary to excess-3 code converter, also draw its truth table and write its K-map specification. 3

12. i) Reduce the following Boolean expression by K-Map – $AB\overline{C} + AB + C + B\overline{C} + D\overline{B}$ also draw the circuit using NOR gate.

ii) What do you mean by don't care condition?

iii) What is redundant group, give example?

iv) Write the two applications of K-Map. 4+2+2+2

13. i) Draw and explain 8X1 Mux using two 4X1 and one 2X1 Mux.

ii) Write the applications of Mux.

iii) Design a 4X2 priority encoder circuit, having highest priority D3.

iv) Find r's and $(r-1)$'s complement of $(2AD)_{16}$.

3+2+3+2

14. i) Implement the Boolean expression using minimum number of 3 input NAND gate

$f(A, B, C, D) = \Sigma(1, 2, 3, 4, 7, 9, 10, 12)$

ii) Explain the TTL circuit with open collection output.

5+5