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(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FIRST SEMESTER EXAMINATION, DECEMBER 2019

FIRST YEAR [BATCH 2019-22]

Date : 11/12/2019 **COMPUTER SCIENCE (Honours)**

Time : 11 am - 1 pm **Paper : I (CC1)** Full Marks : 50

Answer **any five** questions: [5 × 10]

1. a) What will be the outputs of the following C codes?(With explanation)

   i)
   ```
   #include<stdio.h>
   void main( ) {
   int a = 15;
   float b = 1.234;
   printf ("%*f", a, b);
   }
   ```

   ii)
   ```
   #include<stdio.h>
   void main( ) {
   extern int OK ;
   printf ("Value of OK = %d ",OK);
   }
   extern int OK = 1000;
   ```
   (3+3)

   b) i) What is a positional number system? Give an example of the same. (1+1)

   ii) Convert $(1101)_{BCD}$ to gray code. (2)

2. a) Write an algorithm to find out the roots of a quadratic equation. (5)

   b) Implement $F = \overline{w}xz + \overline{w}yz + \overline{x}\overline{y}\overline{z} + wx\overline{y}z$ using NOR Gates only. (5)

3. a) Subtract $(00010110)_2$ from $(00011110)_2$ using 2's complement method. (3)

   b) i) Obtain the simplified expression in POS form for the following Boolean function: $F(A,B,C,D) = \Sigma(1,2,7,10,12,15)$

   ii) Using De Morgan's theorem, show that $\overline{(A+B)}\,\overline{(\overline{A}+\overline{B})} = 0$ (5+2)

4. a) Write a C code snippet to demonstrate the pre-increment and the post-increment uses of '++' operator. (4)

   b) Given the Boolean function: (2×3)

   $F = xy + \overline{x}\overline{y} + \overline{y}z$

   i) Implement it with AND, OR and NOT gate.

   ii) Implement it with only OR and NOT gate.

   iii) Implement it with only AND and NOT gate.

5. a) Show that, $(\exists x)\big(P(x) \wedge Q(x)\big) \rightarrow (\exists x)P(x) \wedge (\exists x)Q(x)$. (3)

   b) How many redundant bits are required to generate the Hamming code corresponding to a 4-bit Binary code? Generate the Hamming code corresponding to the Binary code $(1101)_2$. (2+5)

6. a) Write a C function to find out the minimum between three integers using ternary operator. (4)

   b) Express the following function in sum of minterms and product of maxterms:

   $F(A,B,C,D) = \bar{y}z + wx\bar{y} + wx\bar{z} + \bar{w}\bar{x}z$ (6)

7. a) Differentiate between the following terms :

      i) Auto and Static storage class

      ii) Precedence and Associativity of the operators. (2+2)

   b) Simplify the following Boolean function using a K-map:

   $F(A,B,C) = \Sigma(0,1,4,5)$ (3)

   c) Illustrate the differences between a system software and an application software. (3)

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