2016

INTRODUCTION TO COMPUTING

(CSEN 1201)

Time Alloted : 3 Hours ***Full Marks : 70***

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : **[10×1=10]**

   i) If a two dimensional array int a[10][20] is represented as an array of pointers, then the element a[4][5] can be denoted by :

   (a) *(a +4) + 5

   (b) *a[4] + 5

   (c) *(*(a +4) + 5)

   (d) a[4] + 5

ii) For the truth table below,

Input			Output
A	B	C	X
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

the standard SOP expression is

(a) $X = \overline{A}\,\overline{B}\,\overline{C} + A\,B\,C + A\,\overline{B}\,C$

(b) $X = A\,B\,C + A\,B\,C + A\,B\,C$

(c) $X = A\,\overline{B}\,C + \overline{A}\,B\,C + A\,B\,\overline{C}$

(d) $X = \overline{A}\,\overline{B}\,C + \overline{A}\,B\,C + A\,B\,\overline{C}$

iii) Assuming the number in a 2's compliment form (8-bit) the decimal equivalent of $(10101011)_2$ is

(a) +171 (b) +85

(c) –85 (d) –43

iv) What is the octal representation of $(A3B6.DF)_{16}$?

(a) $(121666.676)_8$ (b) $(121665.766)_8$

(c) $(121656.676)_8$ (d) $(121676.776)_8$

v) What will the following program segment produce :

```
void junk (int i, int *j)
{
i = *j * *j;
*j = i *i;
}
void main ( )
{
int i = 5, j = 2
junk (i, &i)
printf("%d, %d", i, j);
}
```

(a) 4,25 (b) 25, 4

(c) 625, 2 (d) 625, 25

vi) Consider the following declaration :

```
union id {
    char colour;
    int size;
```



```
struct st {
    char country[10]
    union d;
    } flag;
```

To assign a color to a flag, the correct statement is :

(a) flag.color = 'WHITE';

(b) flag.d.color = 'W';

(c) flag.color = 'W';

(d) flag.d.color = 'WHITE';

vii) Output of the program below is

```
int main ()
{
    int x;
    int buf[]= {1,2,3,4,5,6,7,8,9};
    x = (buf+1)[5];
    printf("%d",x);
    return 0;
}
```

(a) 5 (b) 6

(c) 8 (d) 7

viii) Identify which one is not True:

1. Assembler is a program that translates Assembly level Languages code to Machine Language code
2. Interpreter is a program that translates the source code into Machine code much faster

3. Linker takes one or more object files generated by Compiler and combines them into a single executable file library file or another object file.

(a) (1) & (2) (b) only (2)

(c) (2) & (3) (d) only (3)

ix) Variable p is a pointer to a two dimensisonal array of integers i.e. int arr[3][4]; Then which of the following should be the prototype of a function named fun(), if the 2D array "arr" is an argument to the function fun() and "rows" indicate the number of rows of the array "arr"

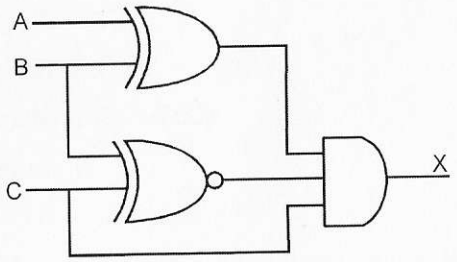
(a) void fun(int*p[4], int rows){ }

(b) void fun(int*p)[4], int rows){ }

(c) void fun(int p[ ][4], int rows){ }

(d) both of (b) and (c)

x) For the logic circuit shown in the figure, the required input combination (A, B, C) to make the output X = 1 is



(a) 1, 0, 1 (b) 0, 0, 1

(c) 1, 1, 1 (d) 0, 1, 1

GROUP - B

2. (a) Show the memory content of $(17.625)_{10}$, using IEEE 754 floating point (32 bits) representation.

(b) Justify, why the range of signed short integer (2 bytes) is –32768 to +32767.

(c) Calculate the following in binary 2's Complement Sign-Magnitude form : $(19)_{10} + (-25)_{10}$

(d) The n-th term of the Fibonacci series is defined as,

$$F_n = F_{n-1} + F_{n-2} \; ; \; F_0 = 0, \; F_1 = 1.$$

Draw a flowchart to display F_n, the n-th term of series.

3+3+3+3 = 12

3. (a) Simplify the following expression into sum of products using Kamaugh map F(A, B, C, D) = Σ(1, 3, 4, 5, 6, 7, 9, 12, 13).

(b) Simplify the Boolean function :

$$\overline{A}(A + B) + (B + AA)(A + \overline{B})$$

(C) Show how a two input XOR gate can be constructed only from 2 input NAND gate.

(3)+(1)+(2)+(2+4) = 12

GROUP - C

4. (a) Say there is a student who knows only the bit wise opeators and assignment operator in C. Now the student wants to extract the last digit of a given integer number (For example if the number is 123, the student will extract the digit 3). So how the student would be able to solve the problem in C?

(b) Write a C program that takes x and n as inputs, and then find the value of the following series up to n terms for a given x :

$$\frac{x}{2}-\frac{x^2}{(2.3)}+\frac{x^3}{(2.3.5)}-\frac{x^4}{(2.3.5.7)}+\frac{x^5}{(2.3.5.7.11)}-\ldots\ldots =$$

$$\sum_{k=1}^{n}\frac{(-1)^{k-1}x^k}{(p_1.p_2.p_3\ldots.p_k)}$$, p_k denotes the k-th prime number.

5+7 = 12

5. (a) State the difference between explicit and implicit type casting with an example.

(b) int main()

```
{
    char c = "A";
    int x = c;
    x = x<<2;
    printf("%d",x);
    printf("%d",x/2 + + +x);
    print("%d",x%200);
    return 0;
}
```

Now state and explain what happens if the above C code is executed.

(c) State the difference between following two declarations

int* p(int x, char* p), int(*p)(int x, char* p)

4+4+4 = 12

Group - D

6. (a) Write a C program to print the pattern where the number of rows or lines h will he taken as input from user. For example, when h = 5, the following pattern will be the output.

```
1   4   6   4   1
  1   3   3   1
    1   2   1
      1   1
        1
```

(b) Write a recursive C program to find the GCD of two numbers given by user (N.B. write only the recursive C function definition) Now write an iterative C program to solve the same problem and state which one will you prefer to solve the problem and why.

6+(3+3) = 12

7. (a) Implement the following function with the prototype given below

int exponent(int x, int y);

This function will evaluate and return x^y if there is no overflow. Otherwise in case of overflow (i.e. value out of range for integer), the function will return 0.

(b) Explain call by value and call by reference with a suitable example.

(c) What is command line argument? Is it a call by value or call by reference explain your answer.

6+3+(1+2) = 12

GROUP - E

8. (a) Explain the meaning of the following declarations :

float (*p) [25];

float (*p) ( );

(b) Differentiate between malloc( ) and calloc( ) with example.

(c) Define a structure called 'employee' to store information of an employee (e_no, e_name, basic_pay, DA, HRA, gross_pay).

Write a program in C to input the e_no, e_name and basic_pay of several employees. The program will calculate the DA (=67% of basic); HRA ((=15% of basic) and gross_pay (=basic + DA + HRA) of all employees and display the details of the employee having the highest salary.

2+3+7 = 12

9. (a) Write a function that will count the total number of occurrences of a string in a sentence. (e.g. the string "put" occurred 2 times in a sentence "Output of the computer program is correct".)

(b) Write a C program whose input is a string of characters, and it outputs 1 or 0 depending on whether the string is a palindrome or not.

6+6 = 12