

Final Examination - 2017-2018
COMPUTER SCIENCE

Time : 3 hrs. 15 min.

F.M. : 80

Std. : XI

PART I

Answer all questions

While answering questions in this Part, indicate briefly your working and reasoning wherever required

Question 1

- (a) State Involution law and prove it with the help of a truth table. (1)
- (b) Show the $X + (Y.X)'$ is a tautology. (1)
- (c) Find the dual of: $X.X' + Y. 'Y' = 0$ (1)
- (d) Write the minterm, when the inputs are $A = 1, B = 0, C = 1, D = 0$. (1)
- (e) Write the truth table for XOR gate. (1)

Question 2

- (a) Write the truth table for a 2 input NOR and NAND gate. (1)
- (b) Find the complement of $XYZ' + X'Y' + YZ$ (2)
- (c) Convert the following expression into its canonical SOP form : (2)
- (d) Minimize the following Boolean expression using the K-map : (2)

$$F(A,B) = A'B' + AB$$

- (e) State the difference between the functions `nextInt()` and `String nextLine()`.

Question 3

- (a) The following functions are part of some class :

```
void fun1(char s[],int x)
{ System.out.println(s);
  char temp;
  if (x<s.length/2)
  { temp = s[x]
    s[x]=s[s.length-x-1];
    s[s.length-x-1]=temp;
    fun1(s,x+1)
  }
}

void fun2(String n)
{ char c[] =new char[n.length()];
  for(int i=0;i<c.length :i++)
    c[i]=n.charAt(i);
  fun1(c,0);
}
```

- (i) What will be the output of fun1 () when the value of s[] = {'J','U','N','E'} and x=1? (2)
- (ii) What will be the output of fun2 () when the value of n = "SCROLL"? (2)
- (iii) State in one line what does the function fun1 () do apart from recursion (1)

PART -II

Answer seven in this part, choosing three question from Section A, two from Section B and two from

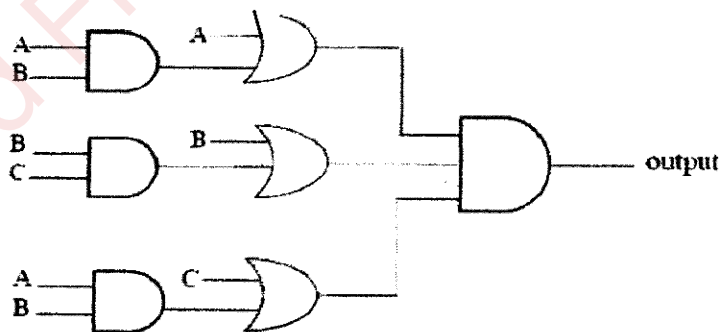
Section C

Question 4

- a. Given the Boolean function $F(A,B,C,D) = \sum (0,1,2,3,5,6,7,10,13,14,15)$
 - (i) Reduce the above expression by using K-map, showing the various groups. [4]
 - (ii) Draw the logic gate diagram for the reduced expression. Assume that the variables and their complements are available as inputs. [1]
- b. Given the Boolean function $F(A,B,C,D) = \prod (0,1,2,4,6,7,8,10,13,14,15)$
 - (i) Reduce the above expression by using K-map, showing the various groups. [4]
 - (ii) Draw the logic gate diagram for the reduced expression. Assume that the variables and their complements are available as inputs. [1]

Question 5

- (a) What is the difference between length and length(). [3]
- (b) Derive a Boolean expression for the logic diagram given below and simplify it. [3]



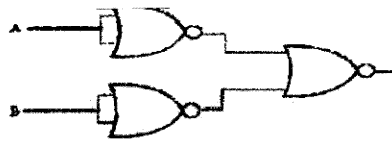
- (c) Reduce the following expression using Boolean laws (3)
- $$F(A, B, C, D) = (A' + C) (A' + C') (A + B + C'D)$$
- (d) What is the difference between Canonical form and Cardinal form of expression? (2)

Question 6

- (a) Differentiate between proposition and wff. [2]
- (b) State the complement properties. Find the complement of the following Boolean expression using De-Morgan's Law : $AB' + A' + BC$.

- (c) Draw the truth table for the input and output for given logic gate. Write the equivalent gate for the following logic gate

(3)



- (d) What is the difference between Tautology and Contradiction?

(2)

SECTION B

Answer any two questions

Each program should be written in such a way that it clearly depicts the logic of the problem

This can be achieved by using mnemonic names and comments in the program.

(Flowcharts and Algorithms are not required)

The programme must be written in Java

Question 7

A class Mixer has been defined to merge two sorted integer arrays in ascending order.

[10]

Some of the members of the class are given below:

Data members/ instance variables :

int arr[]	:	to store the elements of an array
int farr[]	:	to store the elements after merging the array given with the current array.
int n	:	to store the size of the array.

Member functions:

Mixer(int nn)	:	constructor to assign n=nn
Void accept()	:	to accept the elements of the array in ascending order without any duplicates
Void mix (int a2[])	:	to merge the array given in the arguments with the array given as the data member
void display()	:	to display the elements of the farray after merging of the arrays given

Specify the class Mixer, giving details of the constructor(int), void accept(), void mix(int []) and void display().

Question 8

A disarium number is a number in which the sum of the digit to the power of their respective position is equal to the number itself. [10]

Example: $135 = 1^1 + 3^2 + 5^3$

SECTION C

Answer any two Questions.

Question 10.

[5]

Create a text file named marks.txt to store names and marks in computer science for 40 students.

Question 11

A book shelf is designed to store the books in a stack with LIFO (Last In First Out) operation. Define a class Book with the following specifications : (5)

Class name	:	Book
Data members/instance variables :		
name []	:	stores the names of the books
point	:	stores the index of the topmost book
max	:	stores the maximum capacity of the bookshelf
Methods/Member functions :		
Book (int cap)	:	constructor to initialise the data members max = cap and point = - 1 displays the name of the book which was last entered in the shelf. If there is no book left in the shelf, displays the message "SHELF EMPTY"
void add(string v)	:	adds the name of the book to the shelf if possible. otherwise displays the message "SHELF FULL"
void display ()	:	displays all the names of the books available in the shelf

Specify the class Book giving the details of ONLY the functions void tell () and void add (String). Assume that the other functions have been defined.

The main function need not be written.

Question 12

Accept a name to search in a file named friends.txt. Search for the name in the text file and display the message "name found in the file" otherwise display "search unsuccessful" if the name is not in the list. Assume that names stored in the file are in capital case only. (5)