

Class: XII
Max Marks: 70

Evaluation I September 2022
Subject: Computer

Date: 19 /9/22
Max. Time 3 hours

Answer all questions in Part I (compulsory) and six questions from Part-II, choosing two questions from Section-A, two from Section-B and two from Section-C.

PART I – 20 MARKS

Answer all questions.

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

Question 1

[10X1=10]

(i) $B + AB' + AB = ?$

- a) $A+B$ b) $A'+B$ c) $A+B'$ d) AB'

(ii) Select the canonical SOP of the expression: $A+BC$

- a) $A'B'C'+A'BC'+AB'C'+ABC$ b) $ABC+ABC'+AB'C'+AB'C'+A'BC$
c) $ABC+ABC'+AB'C'+AB'C'+A'BC'$ c) None of these

(iii) Choose the equation for the Absorption law

- a. $a+ab=a$ b. $a+b=b+a$ c. $(a')'=a$ d. $a+1=1$

(iv) $P \rightarrow Q$: If You play then you will not go to a party

Choose the converse of the statement.

- a) If You don't play then you will not go to a party
c) If You play then you will go to a party
b) If you play you can party also.
d) If you don't go to a party then you play

(v) $(X \rightarrow Z) \vee \sim(X \rightarrow Y) \wedge (Y \rightarrow Z)$ is a

- a) Tautology b) Contradiction c) Contingency d) Implication

(vi) Write the complement of $F(a,b,c,d) = a + [(b+c).(b'+d')]$.

(vii) State the law of Biconditional elimination.

(viii) State any one purpose of using the keyword new in Java programming.

(ix) Write the dual of $(A'+B.0.1)((A.B'+C).D) + A'B$

(x) What is wff? Explain.

Question 2

i. Write two differences between stack and queue.

[2]

ii. A matrix $MAT[3 \dots 6, -2 \dots 2]$ is stored in the memory in Row Major Wise with each element requiring 2 bytes of storage. If the base address 950, then the address of $MAT[5, 1]$ will be:

[2]

iii. With reference to the program code given below, answer the questions that follow:

```
public static void list(int SNum)
{
    int[] num = new int[SNum];
    num[0] = 0;
    num[1] = 1;
    for (int i = 2; i < SNum; i++)
    {
        num[i] = num[i - 1] + num[i - 2];
    }
}
```

```

for (int i = 0; i < SNum; i++)
{
    System.out.print(num[i] + " ");
}
}

```

- (a) What is the output of the method list() when the value of n=6? [2]
 (b) What is the method list() performing? [1]

iv. The following function magic() is a part of some class. Assume 'n' is a positive integer, greater than 0. Answer the given questions along with dry run / working.

```

int magic (int n)
{
    if(n== 0) return 0;
    else return n%2*10+ magic (n/10);
}

```

If the value of n = 23, what the value return by function magic()

- (a) What will the function magic() return when the value of n=23? [2]
 (b) State in one line what does the function magic() do, apart from recursion? [1]

PART II – 50 MARKS

Answer six questions in this part, choosing two questions from Section A, two from Section B and two from Section C.

SECTION - A

Answer any two questions.

Question 3

i. Given the Boolean function $F(A,B,C,D) = \sum(0, 1, 2, 4,5, 7, 11, 13,15)$.

(a) Reduce the above expression by using 4-variable Karnaugh map, showing the various groups (i.e. octal, quads and pairs).

[4]

(b) Draw the logic gate diagram for the reduced expression. Assume that the variables and their complements are available as inputs.

[1]

ii. Given the Boolean function $F(A,B,C,D) = (A+B+C+D) (A+B+C'+D) (A+B'+C+D')$

$(A+B'+C'+D) (A'+B'+C+D') (A'+B'+C'+D') (A'+B'+C'+D) (A'+B+C+D) (A'+B+C'+D)$

(a) Reduce the above expression by using 4-variable Karnaugh map, showing the various groups (i.e. octal, quads and pairs).

[4]

(b) Draw the logic gate diagram for the reduced expression using NOR gate only. Assume that the variables and their complements are available as inputs.

[1]

Question 4

i. Football Association coach analysis the criteria for a win/ draw of his team depending on the following conditions.

- if the centre and forward players perform well defenders do not perform well.

OR

- if the goalkeeper and defenders perform well but the centre players do not perform well.

OR

- if all players perform well.

The inputs are:

A - Centre player perform well.

B - defenders perform well.

C - forward players perform well.

D - goalkeeper performs well.

(in all of the above cases 1 indicates yes and 0 indicates no)

outputs : F - denotes the win/ draw criteria [1 indicates win/ draw and 0 indicates defeat in all cases.]

Draw the truth table for the inputs and outputs given above and write the SOP expression [5]

ii. Draw the logic circuit and truth table of full adder with the SUM and CARRY equation. [3]

iii. Simplify the following using Boolean laws. [2]

$$AB+A'C'+AB'C(AB+C)$$

Question 5

(i) Draw the logic circuit of an octal to binary Encoder and explain its working. [5]

(ii) Reduce the following function using a K-Map. [3]

$$F(A,B,C)=\sum(0,2,3,4,6)$$

(iii) convert the following function as a product of maxterm $F(P,Q,R)=(P+Q)(P'+R')$ [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 programs must be written in Java.

Question 6

A class Gcd has been defined to find the Greatest Common Divisor of two integer numbers. Some of the members of the class are given below:

Class name : Gcd

Data member/instance variable:

num1 : integer to store the first number

num2 : integer to store the second number

Member functions/methods:

Gcd() : default constructor

void accept() : to accept the numbers

int gcd(int x,int y) : return the GCD of the two number x and y using recursive technique

void display() : displays the result with an appropriate message

Specify the class Gcd, giving details of the Constructor, void accept(), int gcd(int,int), and void display(). Define the main() function to create an object and call the functions accordingly to enable the task.

Question 7

Money is a unit that has 2 parts, Rupees and Paise, where 100 Paise=1 Rupee.

Design a class named Money whose details are as follows:

Class Name : Money

Data member:

int rs, ps : integer to store the value of Rupees and paise.

Member methods:

Money(.....) : parameterized constructor to initialize member data

void fnShow() : to show the member data as Money [Rs 819.75]

Money fnAdd(Money m1, Money m2) : Add m1 and m2. Store the result in corresponding member data and return it.

Specify the class Money, giving the details of the above member data and methods. Also write the main() to create objects and call the other methods accordingly to enable the task of the adding 2 units on Money.

Question 8

Design a class Toggle which toggles a word by converting all upper case alphabets to lower case and vice versa.

Example: The word “mOTivATe” becomes “MotIVatE”

The details of the members of the class are given below:

Class name : Toggle

Data members/instance variables:

str : stores a word
newstr : stores the toggled word
len : to store the length of the word

Methods/Member functions:

Toggle() : default constructor

void readword() : to accept the word

void toggle () : converts the upper case alphabets to lower case and all lower

case alphabets to upper case and stores it in newstr

void display() : displays the original word along with the toggled word

Specify the class Toggle giving details of the constructor, void readword(), void toggle() and void display(). Define the main() function to create an object and call the functions accordingly to enable the task.

SECTION – C

Answer **any two** questions.

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

This can be achieved by using comments in the program and mnemonic names or pseudo codes for algorithms. The programs must be written in Java and the algorithms must be written in general / standard form, wherever required / specified.

(Flowcharts are not required.)

Question 9

A Queue is a linear data structure in which the operations are performed based on FIFO (First In First Out)

Define a class Queue with the following details:

Class name: Queue

Data member/instance variable:

dat[] : array to hold the integer elements

cap : stores the maximum capacity of the queue

front : to point the index of the front

rear : to point the index of the rear.

Member functions/methods:

Queue(int max) : constructor to initialize the data member cap = max, front = rear = 0 and create the integer array

void add_dat(int v) : to add integers from the rear index if possible else display the message("Queue full")

int pop_dat() : to remove and return elements from front, if any, else returns -999

void display() : to display elements of the queue

Specify the class Queue giving the details of void add_dat(int) and int pop_dat().

Assume that the other functions have been defined. The main() function and algorithm need NOT be written.

Question 10

Question 11