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Pre Board Examination 2022-23
Class XII
Subject: Computer Science
Time: 3 Hours                                                          Max. Marks: 70
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PART I (20 MARKS)

Question 1   [1X10=10]

i) If (x => ~y) then, its inverse will be:

a) x => y   b) y => x   c) ~y => x   d) ~x => y

ii) Transitive nature of inheritance is implemented through

a) Single inheritance   b) Multiple inheritance   c) Hybrid Inheritance   d) Multilevel Inheritance

iii) The ability of an object to take many forms is known as:

a) inheritance   b) data abstraction   c) overriding   d) polymorphism

iv) Encoders are used for:

a) Adding 2 bits b) Convert Decimal to Binary   c) Convert Binary to Decimal d) Data transmission

v) The proposition (a <=> b) is represented by:

a) a'b' + ab   b) (a'+b') · (a+b)   c) (a+b)'   d) (a·b)'

vi) A matrix MAT[10][15] is stored in the memory in Row Major Wise with each element requiring 2 bytes of storage. If the base address at MAT[1][2] is 2215, then the address of MAT[3][7] will be:

a) 2285   b) 2315   c) 2319   d)   None of the above

vii) What is the conditional statement to check for the Non-boundary elements in a double dimensional array of 'M' number of rows and 'N' number of columns? The row index is represented by 'r' and the column index is represented by 'c'.

a) (r>0 || r<M-1 && c>0 || c<N-1)   b) (r>0 && r<M-1 || c>0 && c<N-1)

c) (r>0 && r<M-1 && c>0 && c<N-1)   d) (r>0 || r<M-1 || c>0 || c<N-1)

viii) Prove the Boolean expression using Boolean laws. $F=(x'+z)+[(y'+z)+(x'+y)]'=1$

ix) int Toy(int n)

{

return (n<=0)? 1: n%10 + Toy(n/10);

}

With reference to the program code given above, what will the function **Toy()** return when the value of n=56 ?

a) 65   b)   12   c) 651   d) 11

x) Convert POS form to Caonical POS form for the given expression: X'Y+YZ'

Question 2

i) Convert the infix expression into Postfix showing stack status after every step: 3

      A+ (B*C-(D/E^F)*G)*H

ii) What will be the output of the code given below: 2

public static void main(Strings arg[])

{ int i,j;

  for(i=1;i<=6;i++);

  for(j=i+2;j<I;j++);

  System.out.printpln(I + "+" + j); }

a) 79   b) 1+3   c) 7+9   d) 13

iii) For the given Tree answer the following questions
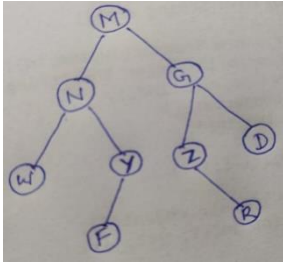
a) Write pre-order traversal of the tree   2
b) State the level no of the nodes N & R ,if the root is at level zero   1
c) List the internal nodes of the Right sub tree.   1
d) Write the successor and predecessor of the node N and Z respectively.   1

PART –II (50 MARKS)
SECTION A (20 MARKS)
Answer any Two Questions

Question 3

i) Given the Boolean Function F(A,B.C,D) =∑(0,1,2,3,4,6,9,11,13)
a) Reduce the above expression by using 4-variable Karnaugh map, showing the various groups (octal, quads and pairs)   [4]
b) Draw the logic gate diagram for the reduced expression.   [1]

ii) Given the Boolean function **F(A,B,C,D) = π(0, 1, 3, 5, 6, 7, 9, 11, 13, 14, 15)**.
a) Reduce the above expression by using 4-variable Karnaugh map, showing the various groups (octal, quads and pairs)   [4]
b) Draw the logic gate diagram for the reduced expression   [1]

Question 4

i) A person is allowed to travel in a reserved coach of the train, if he/she satisfies the criteria given below.

- The person has a valid reservation ticket and a valid ID proof.

OR

- The person doesn't have a valid reservation ticket but holds a valid pass issued by the Railway dept. with a valid ID proof.

OR

- The person is a disabled person and holds a valid pass issued by the Railway dept with a valid ID proof.

The inputs are:

R➔ The person has a valid reservation ticket.
P➔ The person holds a valid pass issued by the Railway Dept.
D➔ The person has a valid ID proof.
H➔ The person is a disabled person.
(In all the above cases 1 indicates yes and 0 indicates no)
T: Denotes allowed to travel (1 indicates yes and 0 indicates no in all the cases)

Draw the Truth Table for the inputs and outputs given below and write the POS expression for
T(R,P,D,H)   [5]
ii) What is a *Full Adder adder*? Draw the logic circuit for the SUM and CARRY expression of a half
adder using only NAND gates.   [3]
iii) Simplify the following expression using Boolean laws: [2]
$\quad$ F = PQ + (P + Q) • (P + PR) + Q

Question 5
i) What is a *decoder*? How is it different from a multiplexer? Draw the logic circuit for a 2 to 4
decoder and explain its working.   [5]
ii) Verify if the following proposition is valid: [3]
$\quad$ (P => Q) ∧ (P => R) = P => (Q ∧ R)
iii) Write the *maxterm* and *minterm* for the function F(A, B,C,D) when, A=1, B=1, C=0 and D=1. [2]

SECTION B (20 MARKS)
(Attempt any two questions from Section B, each carry equal marks approx.)

Question 6   **[10]**
Write a program to declare a matrix A [][] of order MxN .Such that both M and N must be greater than 2
and less than 20 . Allow the user to input the positive integers into this matrix.
a) Sort the element of the outer rows and columns in ascending order using any sorting technique and
arrange them in an array.
b) Calculate the sum of the outer and column elements.
c) Print the original matrix, rearranged matrix and only border elements of the rearranged matrix along
with the sum.
INPUT: M=3, N=3

ORIGINAL MATRIX$\qquad$REARRANGE MATRIX$\qquad$BOUNDARY ELEMENTS

1 7 4$\qquad\qquad\qquad$1 7 4$\qquad\qquad\qquad\qquad$1 3 4
8 2 5$\qquad\qquad\qquad$9 2 5$\qquad\qquad\qquad\qquad$9   5
6 3 9$\qquad\qquad\qquad$8 7 6$\qquad\qquad\qquad\qquad$8 7 6

SUM OF THE ROW AND COLUMN ELEMENTS = 43

Question 7   **[10]**
A class Admission uses an array to contain admission numbers of 100 students. Some of the data
members /Member Functions are
Class Name:$\qquad\qquad\qquad\qquad\qquad\qquad$Admission
Data members /Member Functions are
Adno[] :$\qquad$integer array to store admission number of 100 students

Member Functions:

Admission():   constructor to initialize the array elements.

void fillArray():   to accept the elements of the array in ascending order.

Int binSearch(int l, int u, int y) :   to search for a particular admission number(v) using binary search and **recursive techniques only** returns 1 if found otherwise returns -1;

Specify the class Admission giving details of the constructor, void fillArray() and int binSearch(int l,int u, int y) .Define the main function to create the object and call the functions accordingly to enable the task.

Question 8   [10]

Write a program in to enter a string which is terminated by either ".","?"."!" .Each word of the Sentence is separated by a single blank space. Perform the following task in the sentence.

a) Display the count of palindrome words in the sentence.

b) Display the palindrome words in the sentence.

INPUT:

MOM AND DAD ARE COMING AT NOON

OUTPUT: MON DAD NOON

NUMBER OF PALINDROME WORDS: 3

SECTION C
(Attempt any two Questions)

Question 9

i) A linked list is formed from the objects of the class: [3]

Class Node

{

int num;

Node next;

}

Write an *Algorithm* **OR** a *Method* to insert a node at the beginning of an existing linked list.
The method declaration is as follows:

void InsertNode(Nodes starPtr, int n)

ii) With reference to the program code given below, answer the questions that follow:

```
void dimen(int n[ ][ ])
{ int p=0;
for (int i=0;i<n.length;i++)
for(int j=0;j<n[0].length;j++)
{ if(i==0 ||i==n.length-1 || j==0 || j==n[0].length-1)
p=p+n[i][j];   }
System.out.print(p);
}
```

a) What will be the output of the method **dimen()** when the value of n[ ][ ] ={{2,3,7},{1,5,9},{10,-3,8}} ?   [1]

b) What is the method **dimen( )** performing?   [1]

Question 10 [5]

A super class Product has been defined to store the details of the product sold by a Wholesaler to the retailer. Define a subclass Sales to compute the total amount paid by the retailer with or without fine along with service tax. The details of both the classes are given below.

Class Name : **Product**

Data Members**:**

name : stores the name of the product.

code : integer to store the product code

amount : stores the total sale amount of the product in decimals

Member Functions**:**

Product(String n, int c, double p) **:** parameterized constructor to assign values to the instance variables. Member name=n, code=c and amount =p.

void show() **:** display the details of the product.

Class name : **Sales**

Data Members**:**

Day **:** stores the number of days to pay the sale amount

tax : to store the service tax (in decimals)

totamt : to store the total amount(in decimals)

Member Functions**:**

Sales (….) **:** parameterized constructor to assign values to the instance variables of both the classes.

void compute() **:** calculate the service tax @ 12.4 % of the actual sale amount calculates the fine @ 2.5 % of the actual sale amount only if the amount paid by the retailer to wholesaler exceeds 30 days. Calculates the total amount paid by the Retailer as (actual sale amount+service tax+fine)

void show() **:** displays the data member of super class and the total amount.

Assume that the super class Product has been defined. Using the concept of inheritance, specify the class Sales giving details of the constructor(…), void compute() and void show().

Question 11 [5]

The following function Mystery() is a part of some class. What will the function Mystery() return when the value of num is = 43629, x=3 and y=4 respectively. Show the dry run/working.

```
int Mystery( int num,int x,int y)
{
if(num<10)
return num;
else
{
int z= num%10;
if(z%2==0)
return z*x + Mystery(num/10,x,y);
else
return z*y+ Mystery(num/10,x,y);
```