Higher Secondary "CBSE" On Demand Exam. December-2019

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971

Subject: COMPUTER SCIENCE (THEORY)

Time: 03 Hours | Maximum Marks: 70

- Please check that this question paper contains **1** to **24** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **07** questions.
- Please write down the Serial Number of the question before attempting it.
- 15 minutes time has been allotted to read this question paper.

General Instructions –

(i) All question are compulsory.

(ii) Answer either section A or section B:

  (a) Section A Programming Language with C++

  (b) Section B Programming Language with Python

(iii) Section C is compulsory.

(iv) In Question 2, Question 3 and Question 4 has internal choices.

(v) Marks allotted to every question are indicated against it.

SECTION – A

(Only for candidates, who opted for C++)

1. (a) What is the difference between Global Variable and Local Variable? Also, give a suitable C++ code to illustrate both. **(2)**

(b) Name the header file required for successful compilation of the given code : **(1)**

```
main( )
{
char str [20] = ”Exam”;
cout<<setw(20)<<str;
return 0;
}
```

(c) Rewrite the following program after removing the syntactical errors (if any) underline each correction. **(2)**

```
#include [iostream.h]
class MEMBER
{
int Mno; float Fees;
PUBLIC:
void Register()
{
cin>>Mno>>Fees;
}
void Display
{
cout<<Mno<<″ : ″<<Fees<<endl;
}
};
void main()
{
MEMBER M;
Register();
M.Display();
}
```

(d) Find the output of the following program: **(3)**

```
#include<iostream.h>
void Changethecontent (int Arr[ ], int Count)
{
for (int C = 1; C<Count; C++)
Arr[C – 1] + = Arr [C];
}
void main()
{
int A[ ] = {3,4,5}, B[ ] = {10,20,30,40}, C[ ] = {900, 1200};
Changethecontent (A,3);
Changethecontent (B,4);
Changethecontent (C,2);
for (int L = 0; L<3; L++) cout <<A[L}<<'#';
cout<<endl;
for (L=0;L<4;L++) cout<<B[L]<<'#';
cout<<endl;
for(L=0;L<2;L++) cout <<C[L]<<'#';
}
```

(e) Find the output of the following program: **(2)**

```
#include<iostream.h>
void secret(char Str[ ])
{
for (int L = 0; Str [L]! = '/0'; L++);
for (int C = 0; C<L/2; C++)
if (Str[C]== 'A' || Str[C] ==‘E’)
Str[C]= '#';
else
{
char Temp = Str[C];
Str[C]=Str[L-C-1];
Str[L-C-1]=Temp;
}
}
void main ()
{
char Message[ ] ="ArabSagar";
Secret(Message);
cout<<Message<<endl;
}
```

(f) If the following program, find the correct possible output(s) from the options: **(2)**

```
#include<iostream.h>
#include<stdlib.h>
void main( )
{
randomize( );
int p = 99, q = 999;
int x = random(3) + 4;
int y = random(2) + 2;
for(int i=0; i<x; i++)
cout<<'#';
cout<<p<<'-';
for(i=0; i<y; i++)
cout<<'@';
cout<<q<<endl;
}
```

i) ##99-@999
ii) ##99-@@999
iii) ######99-@@999
iv) ####99-@@@999

2. (a) Is Inheritance and containership mean the same? What are the similarities and difference between the two? **(2)**

(b) Answer the questions (i) and (ii) after going through the following class: **(2)**

```
class Factory
{
private:
char Name [30];
int worker;
public:
Factory( )                                          //function 1
{ strcpy (Name, ″Blank″);
worker = 0;
}
void Details( )                                     //function 2
{ cout<< Name<< endl<<worker<<endl;}
Factory (char *Fact_name, int No);                  //function 3
Facotry (Factory & F);                              //function 4
};
```

(i) In OOP, what is function 4 referred as? Also write a statement which will invoke this function?

(ii) In OOP, which concept is illustrated by function 1, function 3 & function 4 together?

OR

(b) Answer the questions (i) & (ii) after going through the following program:

```
class Match
{
int Time;
public:
Match ()                                    //Function 1
{
Time=0;
cout<<"Match commences"<<endl;
}
void Details()                              //Function 2
{
cout<<"Inter Section Basketball Match"<<endl;
}
Match(int Duration)                         //Function 3
{
Time=Duration;
cout<<"Another Match begins now"<<endl;
}
Match(Match & M)                            //Function 4
{
Time=M.Duration;
cout<<"Like Previous Match"<<endl;
}
};
```

(i) Which category of constructor – Function 4 belongs to and what is the purpose of using it?

(ii) Write statements that would call the member Function 1 and Function 3.

(c) Define a class Computer in C++ with following description : **(4)**

Private Members:

- Processor_speed
- Price
- Processor_type

Public Members:

- A constructor to initialize the data members.
- A function cpu_input() to enter value of processor_speed.
- A function void setcostANDtype( ) to change the speed of the processor and also find the cost and type depending on the speed:

Processor_speed	Price	Processor_type
4000 MHz	₹ 30,000	C2D
<4000 &>=2000	₹ 25,000	PIV
<2000	₹ 20,000	Celeron

- A function cpu_output () to display values of all the data members.

(d) Consider the following declarations and answer the question given below: **(4)**

```
class Goods
{
int id;
protected :
char name[20];
long qty;
void Incr (int n);
public :
Goods ();
~Goods();
```

```
void get();
};
class Food_products : protected Goods
{
char exp_dt[10];
protected :
int id;
int qty;
public :
void getd();
void showd();
};
class Cosmetics : private Goods
{
int qty ;
char exp_date[10];
protected :
int id;
public :
~Cosmetics();
Cosmetics();
void show();
};
```

(i) Name the all protected members of class Food_products.

(ii) Name the member functions accessible through the object of class Food_products.

(iii) From the following, Identify the member function(s) that cannot be called directly from the object of class Cosmetics: show (), getd(), get().

(iv) If the class cosmetics inherit the properties of Food_products class also, then name the type of inheritance.

OR

(d) Answer the questions (i) to (iv) based on the following:

```
class CUSTOMER
{
int Cust_no;
char Cust_Name [20);
protected :
void Register();
public: CUSTOMER();
void Status();
};
class SALESMAN
{
int Salesman_no;
char Salesman_Name[20);
protected :
float Salary;
public :
SALESMAN();
void Enter();
void Show();
};
class SHOP : private CUSTOMER, public SALESMAN
{
char Voucher_No[10);
char Sales_Date[8);
public :
SHOP();
void Sales_Entry{);
void Sales_Detail();
};
```

(i) Write the names of data members which are accessible from objects belonging to class Customer.

(ii) Write the names of all the member functions which are accessible from objects belonging to class Salesman.

(iii) Write the names of all the members which are accessible from the member function of class shop.

(iv) How many bytes will be required by an object belonging to class SHOP?

3. (a) Write a function in C++ to combine the contents of two equi – sized arrays A and B by adding their corresponding elements as the formula A[i]+B[i]; where value i varies from 0 to N – 1 and transfer the resultant content in the third same sized array C. **(3)**

OR

(a) Write a function TRANSFER (intA[ ], int B[ ], int Size) in C++ to create the elements of array B[ ] with the help of corresponding elements of array A[ ] i.e. If A[N] is positive number, B[N] should be 1, if A[N] is negative number B[N] should be – 1, and if A[N] is zero B[N] should also be 0.

For example:

If the content of array A is

-98, 56, 0, -23, -34, 54

The content of array B should become

-1, 1, 0, -1, -1, 1

(b) An array P[20][30] is stored in the memory along the column with each of the element occupying 4 bytes, find out the Base Address of the array, if an element P[2][20] is stored at the memory location 5000. **(3)**

(c) Write a function in C++ to perform Push operation on a dynamically allocated stack containing real numbers. **(4)**

(d) Write a function in C++ to find sum of rows from a two dimensional array. **(2)**

(e) Evaluate the following postfix notation of expression: **(2)**

True, False, AND, True, True, NOT, OR, AND

4. (a) Observe the program segment given below carefully and fill the blanks marked as statement 1 and statement 2 using seekp() and seekg() functions for performing the required task. **(1)**

```
#include <fstream.h>
class Item
{
int Ino; char Item [20];
public :
//Function to search and display the content from a particular record
number void Search (int);
//Function to modify the content of a particular record number
void Modify (int);
} ;
void Item : : Search (int RecNo)
{
fstream File;
File.open (″STOCK.DAT″, ios : : binary|ios : : in);
_____                    //Statement 1
File.read((char*)this, sizeof(Item));
cout<<Ino<<″==>″<<Item<<endl;
File.close();
}
void Item : : Modify (int RecNo)
{
fstream File;
File.open(″STOCK.DAT″, ios : : binary|ios : :in|ios : : out);
cout>>Ino; cin.getline(Item, 20);
_____                    //Statement 2
File.write((char*)this, sizeof(Item));
File.close();
}
```

(b) Write a function in C++ to count the number of lines present in a text file "STORY.TXT". **(2)**

(c) Write a function in C++ to search for a BookNo from a binary file "BOOK.DAT", assuming the binary file is containing the objects of the following class. **(3)**

```
class books
{
int Bno;
char Title [20];
public :
int RBno(){return Bno;}
void Enter(){cin>>Bno;gets(Title);}
void Display (){cout<<Bno<<Title<<endl;
}
} ;
```

OR

(c) Write a function in C++ to add new objects at the bottom of a binary file "STUDENT.DAT", assuming the binary file is containing the objects of the following class.

```
class STUD
{
int Rno;
char Name[20];
public :
void Enter()
{
cin>>Rno;
gets(Name);
}
void Display()
{
cout<<Rno<<Name<<endl;
}
} ;
```

SECTION – B

(Only for candidates, who opted for Python)

1. (a) Differentiate between break and continue statement with the help of an example. **(2)**

   (b) Identify and write the name of the module to which the following functions belong : **(1)**

   i. ceil( ) ii. findall()

   (c) Observe the following Python code very carefully and rewrite it after removing all syntactical errors with each correction underlined. **(2)**

```
DEF execmain ( ) :
    x = input (″Enter a number : ″)
    if (abs (x) = x) :
      print ″You entered a positive number″
    else :
        x = * - 1
        print ″ Number made positive : ″x
    execmain ( )
```

   (d) Write the output of the following Python code : **(2)**

```
i = 5
j = 7
x = 0
i = i + (j – i)
x = j + i
print x, ″: ″, i
j = j * * 2
x = j + i
i = i + 1
print i, ″: ″, j
```

(e) Write the output of the following Python program code : **(3)**

```
Data = [' D ', ' O ', '  ', ' l ', ' t ', '  ', '@', '  ', ' 1 ', ' 2  ', ' 3 ', '  ',' ! ' ]
for i in range (len (Data) – 1) :
    if (Data [ i ]. isupper( ) ) :
       Data [ i ] = Data [ i ]. lower ( )
    elif (Data [ i ]. isspace ( ) ) :
        Data [ i ] = Data [ i + 1]
print Data
```

(f) Study the following program and select the possible output(s) from the options (i) to (iv) following it. Also, write the maximum and the minimum values that can be assigned to the variable Y. **(2)**

```
import random
X = random.random ( )
Y = random.randint (0, 4)
Print int (X), ″ : ″, Y + int (X)
```

(i) 0 : 0

(ii) 1 : 6

(iii) 2 : 4

(iv) 0 : 3

2. (a) Explain operator overloading with the help of an example. **(2)**

(b) Observe the following Python code and answer the questions (i) and (ii):

```
Class BOOK :
    count = 0
    def _ init_(self) : # Function 1
        self . Author = ″Not assigned″
        self . Publisher = ″Not assigned″
        self . ISBN = ″Not assigned″
    def display (self) :
        print self.Author, self.Publisher, self. ISBN
    @staticmethod
    def bookcount ( ) : # Function 2
        Book. count = BOOK. count + 1
        return BOOK . count
```

(i) How is data member "count" different from data member "Author"? **(1)**

(ii) Fill in the blanks : **(1)**

```
B=BOOK( )
_____# Write statement to invoke Function2
_____# Write statement to invoke Function3
```

OR

(b) Answer the questions (i) and (ii) after going through the following class definition :

```
class Toy :
tid =0;
tcat = " "
def__init__(self) :          // Function 1
    ……..// Blank 2
```

(i) Explain relevance of Function 1.

(ii) (a) Fill in the blank2 with a statement to create object of the class TOY.

(b) Write statement to check whether tprice is an attribute of class TOY.

(c) Define a class COURSE in Python with the following description : **(4)**

Instance Attributes :

REGNO	Integer
CNAME	String
Score	Float
Fees	Float

Methods :

- A constructor to assign REGNO as 0, Score and Fees as 0.0
- SetCourse() to assign Course and Fees on the basis of the Score input as per the following criteria :

Score	CNAME	Fees
>=9.0-<=10.0	Clinical Psychology	10000.0
>=8.0-<9.0	Corporate Counselling	8000.0
>=5.0-<8.0	Guidance and Counselling	6000.0
Less than 5.0	Not Eligible	0.0

- GETDATA() to input REGNO and Score and invoke SetCourse()
- DISPLAY () to display all the details.

(d) Answer the questions (i) and (ii) based on the following : **(4)**

```
class Vehicle (object) :
    def __init__(self, 1 = 0, w = 0):
    self.length = 1
    self.width=w
    def define (self) :
    print ″Vehicle with length″, self.length, ″in & width″, self.width, ″in″
class Car (Vehicles) :
    def __ init__(self, clr, seats, l, w) :
        Vehicle.__init__(self, l, w)                    # Line 3
        self. colour = clr
        self.seatingCapacity=seats
    def chageGears(self, gr) :
        print ″changed to gear″, gr
    def turn (self, direction) :
        print ″turned to″, direction, “direction”
class RacingCar (Car) :
    def __init__(self, clr, seats, l, w, tr, spd) :     # Line 1
        Car. __init __(self, clr, seats, l, w)          # Line 2
        self. turnRadius=tr
        self.speed = spd
    def start (self) :
        self. define ( )
        self. changeGears (2)
        print ″Racing car starts – ready to vroom! ″
```

(i) Explain the relationship between Line 1, Line 2 and Line 3.

(ii) Predict the output that will be produced on the execution of the following statements :

```
rcar = RacingCar ( 'Blue', 2, 206, 78.5, 6, 200)
rcar.start ( )
rcar.turn ("left")
```

3. (a) Write the definition of a function Reverse (X) in Python, to display the elements in reverse order such that each displayed element is the twice of the original element (element * 2) of the List X in the following manner: **(2)**

Example :

If List X contains 7 integers is as follows :

X[0]	X[1]	X[2]	X[3]	X[4]	X[5]	X[6]
4	8	7	5	6	2	10

After executing the function, the array content should be displayed as follows :

20 4 12 10 14 16 8

OR

Explain try……except…..else……. with the help of user defined function **def divide (x, y)** which raises an error when the denominator is zero while dividing x by y and displays the quotient otherwise.

(b) Consider the following unsorted list : **(3)**

[22, 54, 12, 90, 55, 78]

Write the passes of selection sort for sorting the list in ascending order till the 3rd iteration.

(c) Consider the following class Order and do as directed : **(4)**

```
class ORDER :
    L = [ ]
    def __ init__(self) :
        self.OID = 0
    def insertorder (self) :
        self.OID = input ("Enter Order Id")
        _____ → Blank 1
    def delorder (self) :
        :
        :
```

(i) Fill in the blank 1 with a statement to insert OID in the Queue maintained using List L.

(ii) Complete the definition of **delorder**() to delete OID from the Queue maintained using List L, the function should return the OID being deleted or – 1 in case the Queue is empty.

(d) Write a generator function to generate odd numbers between a and b (including b). Note : a and b are received as an argument by the function. **(3)**

(e) Evaluate the following postfix expression using a stack. Show the contents of stack after execution of each operation : **(2)**

10, 40, 25, -, *, 15, 4, *, +

4. (a) Nancy intends to position the file pointer to the beginning of a text file. Write Python statement for the same assuming F is the File object. **(1)**

OR

Consider the following code :

```
f = open ("mytry", "w+")
f.write("0123456789abcdef")
f.seek (-3,2)     // Statement 1
printf.read(2)    //Statement 2
```

Explain statement 1 and given output of statement 2.

(b) Write a function **countmy**( ) in Python to read the text file "DATA.TXT" and count the number of times "my" occurs in the file. **(2)**

For example if the file "DATA.TXT" contains :

"This is my website. I have displayed my preferences in the CHOICE section."

The **countmy( )** function should display the output as :

"my occurs 2 times".

(c) Write a function in Python to search and display details of all those students, whose stream is "HUMANITIES" from pickled file "Student. dat". Assuming the pickled file is containing the objects of the following class : **(3)**

```
class STUDENT :
def  __ init __ (self) :
        self.RNO = 0
        self.NAME = ″  ″
        self.STREAM = ″  ″
        self.PERCENT = 0.0
def ACCEPT (self) :
        self.RNO = input (″Enter Roll no″)
        self.NAME = raw _input (″Enter Name″)
        self.STREAM = raw _input (″Enter Stream″)
        self.PERCENT = input (″Enter percentage″)
def DISPLAY (self) :
        print self.RNO, self.NAME, self.STREAM, self.PERCENT
def RET _STREAM (self) :
        return (self.STREAM)
```

SECTION – C

(For all the candidates)

5. (a) What do you understand by Primary Keys & Candidate Keys? **(2)**

Consider the following tables GAMES and PLAYER and answer (b) and (c) parts of this question :

Table : GAMES

GCode	Game Name	Type	Number	Prize Money	Schedule Date
101	Carom Board	Indoor	2	5000	23-Jan-2004
102	Badminton	Outdoor	2	12000	12-Dec-2003
103	Table Tennis	Indoor	4	8000	14-Feb-2004
105	Chess	Indoor	2	9000	01-Jan-2004
108	Lawn Tennis	Outdoor	4	25000	19-Mar-2004

Table : PLAYER

Pcode	Name	Geode
1	Nabi Ahmad	101
2	Ravi Sahai	108
3	Jatin	101
4	Nazneen	103

(b) Write SQL Commands for the following statements : **(4)**

(i) To display the name of all GAMES with their GCodes.

(ii) To display the details of those GAMES which are having Prize Money more than 7000?

(iii) To display sum of PrizeMoney for each Type of GAMES.

(iv) To display all the information of all GAMES those name start with 'C'.

(c) Give the output of the following SQL queries : **(2)**

(i) SELECT COUNT(DISTINCT Number) FROM GAMES;

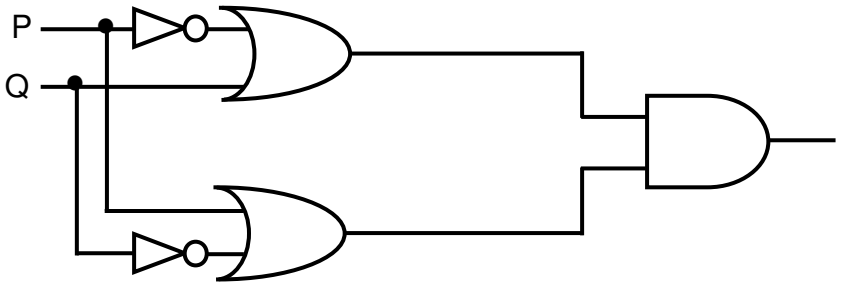
(ii) SELECT MAX (ScheduleDate), MIN (ScheduleDate) From GAMES;

(iii) SELECT Name, GameName FROM GAMES G, PLAYER P WHERE G.Gcode = P.Gcode AND G.PrizeMoney>10000;

(iv) SELECT DISTINCT Geode FROM PLAYER;

6. (a) State and verify Distributive Laws by truth table. **(2)**

(b) Write the equivalent Boolean Expression for the following Logic Circuit **(2)**



(c) Write the POS form of a Boolean function F, which is represented in a truth table as follows : **(1)**

U	V	W	F
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

(d) Reduce the following Boolean Expression using K – Map : **(3)**

$F(A, B, C, D) = \Sigma (0, 1, 2, 4, 5, 6, 8, 10)$

7. (a) Define the term Bandwidth. Give any one unit of Bandwidth. **(1)**

(b) When do you prefer XML over HTML and why? **(1)**

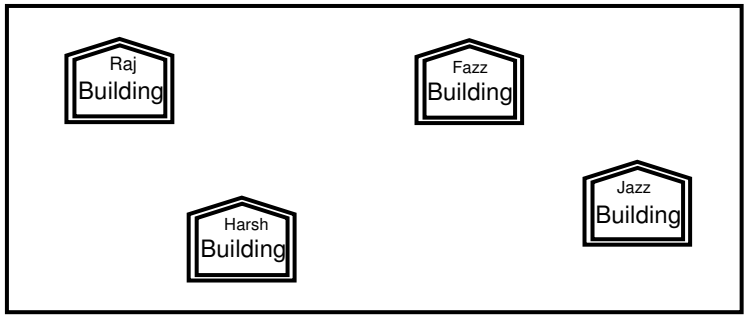
(c) How firewalls protect our network? **(1)**

(d) What is OSS and FLOSS? **(1)**

(e) What is VoIP? **(1)**

(f) Differentiate between freeware and shareware. **(1)**

(g) Ravya Industries has setup its new center at Kaka Nagar for its office and web based activities. The company compound has 4 building as shown in the diagram below : **(4)**



Center to center distances between various buildings is as follows :

Harsh Building to Raj Building	50m
Raj Building to Fazz Building	60m
Fazz Building to Jazz Building	25m
Jazz Building to Harsh Building	170m
Harsh Building to Fazz Building	125m
Raj Building to Jazz Building	90m

Number of Computers in each of the buildings is follows :	
Harsh Building	15
Raj Building	150
Fazz Building	15
Jazz Building	25

(i) Suggest a cable layout of connections between the buildings.

(ii) Suggest the most suitable place (i.e. building) to house the server of this organisation with a suitable reason.

(iii) Suggest the placement of the following devices with justification :

(i) Internet Connecting Device/Modem

(ii) Switch

(iv) The organisation is planning to link its sale counter situated in various parts of the same city, which type of network out of LAN, MAN or WAN will be formed? Justify your answer.
