SQP - Computer Science (Code: 083)
Class XII (2016-17)

Time: 3Hrs.			MM: 70	
Instructions: i. All Questions are Compulsory. ii. Programming Language : Section – A : C++ iii. Programming Language : Section – B : Python iv. Answer either Section A or B and Section C is compulsory				
		Section – A		
1	(a)	Explain conditional operator with suitable example?	2	
	(b)	Which C++ header file(s) are essentially required to be included to run/execute the following C++ code : **void main**() **{** **char *word1="Hello",*word2="Friends";** **strcat(word1,word2);** **cout<<word1;** **}**	1	

	(c)	Rewrite the following program after removing the syntactical errors (if any). Underline each correction.
		
		#include<conio.h>
		#include<iostream.h>
		#include<string.h>
		#include<stdio.h>
		class product
		{
		  int product_code,qty,price;
		  char name[20];
		  public:
		  product(){
		        product_code=0;qty=0;price=0;
		        name=NULL;
		        }
		  void entry()
		  {
			2	

```
      cout<<"\n Enter code,qty,price";
      cin>>product_code>>qty>>price;
      gets(name);
     }
     void tot_price() {return qty*price;}
};
void main()
{
 p product;
 p.entry();
 cout<<tot_price();
}
```

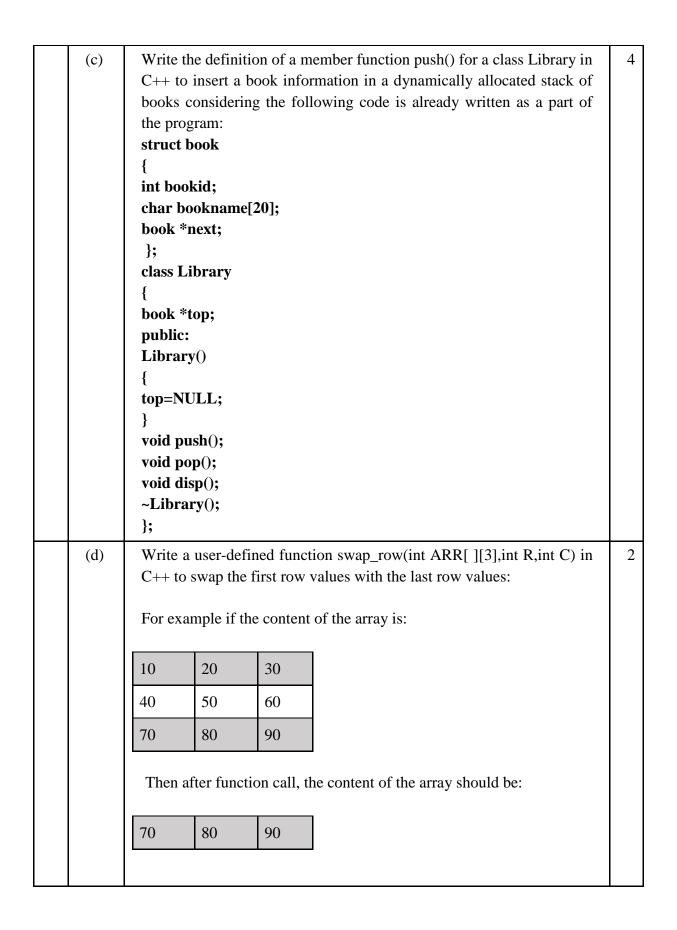| | (d) | Write the output of the following C++ program code:
Note: Assume all required header files are already being included in the program.

```void change(int *s)
{
 for(int i=0;i<4;i++)
 {
    if(*s<40)
    {
    if(*s%2==0)
    *s=*s+10;
    else
    *s=*s+11;
    }
    else
    {
    if(*s%2==0)
    *s=*s-10;
    else
    *s=*s-11;
    }
    cout<<*s<<" ";
    s++;
 }
}
void main()
{``` | 2 |

|   |   |   | ```
  int score[]={25,60,35,53};
   change(score);
  }
``` |   |
|---|---|---|---|---|
|   | (e) | Write the output of the following C++ program code:<br>Note: Assume all required header files are already being included in the program.<br><br>```cpp
class seminar
{
char topic[30];
int charges;
public:
seminar()
{
strcpy(topic,"Registration");
charges=5000;
}
seminar(char t[])
{
strcpy(topic,t);
charges=5000;
}
seminar(int c)
{
strcpy(topic,"Registration with Discount");
charges=5000-c;
}
void regis(char t[],int c)
{
strcpy(topic,t);
charges=charges+c;
}
void regis(int c=2000)
{
charges=charges+c;
}
void subject(char t[],int c)
{
strcpy(topic,t);
charges=charges+c;
``` | 3 |

```
}
void show()
{
cout<<topic<<"@"<<charges<<endl;
}
};
void main()
{
seminar s1,s2(1000),s3("Genetic Mutation"),s4;
s1.show();
s2.show();
s1.subject("ICT",2000);
s1.show();
s2.regis("Cyber Crime",2500);
s2.show();
s3.regis();
s3.show();
s4=s2;
s4.show();
getch();
}
```

	(f)	Observe the following program carefully and attempt the given questions:	2

```
#include<iostream.h>
#include<conio.h>
#include<stdlib.h>
void main()
{
clrscr();
randomize();
char courses[][10]={"M.Tech","MCA","MBA","B.Tech"};
int ch;
   for(int i=1;i<=3;i++)
      {
        ch=random(i)+1;
        cout<<courses[ch]<<"\t";
      }
getch();
}
```

		I. Out of all the four courses stored in the variable courses, which course will never be displayed in the output and which course will always be displayed at first in the output? II. Mention the minimum and the maximum value assigned to the variable ch?	
2	(a)	What do you understand by Function overloading or Functional polymorphism? Explain with suitable example.	2
	(b)	Answer the questions(i) and (ii) after going through the following class: **class planet** **{** **char name[20];char distance[20];** **public:** **planet()** **//Function 1** **{** **strcpy(name, "Venus");** **strcpy(distance,"38 million km");** **}** **void display(char na[],char d[])** **//Function 2** **{** **cout<<na<<"has "<<d<<" distance from Earth"<<endl;** **}** **planet(char na[], char d[])** **//Function 3** **{** **strcpy(name,na);** **strcpy(distance,d);** **}** **~planet()** **//Function 4** **{** **cout<<"Planetarium time over!!!"<<endl;** **}** **};**	2
		I. What is Function 1 referred as? When will it be executed?	
		II. Write suitable C++ statement to invoke Function 2.	
	(c)	Define a class DanceAcademy in C++ with following description: Private Members • Enrollno of type int	4

- Name of type string
- Style of type string
- Fee of type float
- A member function chkfee( ) to assign the value of fee variable according to the style entered by the user according to the criteria as given below:

Style	Fee
Classical	10000
Western	8000
Freestyle	11000

Public Members
- A function enrollment() to allow users to enter values for Enrollno,Name, Style and call function chkfee()to assign value of fee variable according to the Style entered by the user.
- A function display() to allow users to view the details of all the data members.

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

```
class indoor_sports
{
  int i_id;
  char i_name[20];
  char i_coach[20];
protected:
  int i_rank,i_fee;
  void get_ifee();
public:
  indoor_sports();
  void iEntry();
  void ishow();
};
class outdoor_sports
{
  int o_id;
  char o_name[20];
```

4

| | | ```
   char o_coach[20];
protected:
 int orank,ofee;
 void get_ofee();
public:
 outdoor_sports();
 void oEntry();
 void oshow();
};
class sports:public indoor_sports,protected outdoor_sports
{
 char rules[20];
 public:
      sports();
   void registration();
   void showdata();
};
``` | |
|---|---|---|---|
		(i) Name the type of inheritance illustrated in the above C++ code.	
		(ii) Write the names of all the members, which are accessible from the objects belonging to class outdoor_sports.	
		(iii) Write the names of all the member functions, which are accessible from the member function of class sports.	
		(iv) What will be the size of the object belonging to class indoor_sports?	

3	(a)	Write the definition of a function grace_score (int score [], int size) in C++, which should check all the elements of the array and give an increase of 5 to those scores which are less than 40.
		
		Example: if an array of seven integers is as follows:
		    45, 35, 85, 80, 33, 27, 90
		After executing the function, the array content should be changed as follows:
		    45, 40, 85, 80, 38, 32, 90
			3

	(b)	An array P[30][20] is stored along the column in the memory with each element requiring 2 bytes of storage. If the base address of the array P is 26500, find out the location of P[20][10].	3

	(c)	Write the definition of a member function push() for a class Library in C++ to insert a book information in a dynamically allocated stack of books considering the following code is already written as a part of the program:	4

struct book
{
int bookid;
char bookname[20];
book *next;
** };**
class Library
{
book *top;
public:
Library()
{
top=NULL;
}
void push();
void pop();
void disp();
~Library();
};

	(d)	Write a user-defined function swap_row(int ARR[ ][3],int R,int C) in C++ to swap the first row values with the last row values:	2

For example if the content of the array is:

10	20	30
40	50	60
70	80	90

Then after function call, the content of the array should be:

70	80	90

			10 20 30	
	(e)	Evaluate the following POSTFIX expression. Show the status of Stack after execution of each operation separately: **45, 45, +, 32, 20, 10, /, -,***	2

4	(a)	Find the output of the following C++ code considering that the binary file sp.dat already exists on the hard disk with 2 records in it.
		class sports
		{
		  int id;
		  char sname[20];
		  char coach[20];
		  public:
		  void entry();
		  void show();
		  void writing();
		  void reading();
		}s;
		
		  void sports::reading()
		  {
		  ifstream i;
		  i.open("sp.dat");
		  while(1)
		  {
		  i.read((char*)&s,sizeof(s));
		  if(i.eof())
		  break;
		  else
		  cout<<"\n"<<i.tellg();
		  }
		  i.close();
		  }
		  void main()
		  {
		  s.reading();
		  }
			1

	(b)	Write a user defined function word_count() in C++ to count how many words are present in a text file named "opinion.txt".	2

For example, if the file opinion.txt contains following text:

> Co-education system is necessary for a balanced society. With co-education system, Girls and Boys may develop a feeling of mutual respect towards each other.

The function should display the following:

Total number of words present in the text file are: 24

(c) Write a function display () in C++ to display all the students who have got a distinction(scored percentage more than or equal to 75) from a binary file "stud.dat", assuming the binary file is containing the objects of the following class:

```cpp
class student
{
    int rno;
    char sname [20];
    int percent;
    public:
    int retpercent()
    {
    return percent;
    }
    void getdetails()
    {
    cin>>rno;
        gets(sname);
    cin>>percent;
    }
    void showdetails()
    {
    cout<<rno;
        puts(sname);
    cout<<percent;
    }
};
```

3

Section - B (Python)			
1	(a)	Carefully observe the following python code and answer the questions that follow: ```\nx=5\ndef func2():\n x=3\n global x\n x=x+1\n print x\n print x\n``` On execution the above code produces the following output. 6 3 Explain the output with respect to the scope of the variables.	2
	(b)	Name the modules to which the following functions belong: a. uniform() b. fabs()	1
	(c)	Rewrite the following code after removing the syntactical errors (if any). Underline each correction. ```\ndef chksum:\n x= input("Enter a number")\n if (x%2 = 0):\n for i range(2*x):\n print i\n loop else:\n print "#"\n```	2
	(d)	Observe the following Python code carefully and obtain the output, which will appear on the screen after execution of it. ```\ndef Findoutput():\n L = "earn"\n X=""\n L1=[]\n count = 1\n for i in L:\n if i in['a','e','i','o','u']:\n X=X+i.swapcase()\n else:\n if (count%2!=0):\n X= X+str(len(L[:count]))\n else:\n X = X+i\n count = count+1\n print X\nFindoutput()\n```	2

	(e)	What output will be generated when the following Python code is executed?	3
| | | ```python
def ChangeList():
    L=[]
    L1=[]
    L2=[]
    for i in range(1,10):
        L.append(i)
    for i in range(10,1,-2):
        L1.append(i)
    for i in range(len(L1)):
        L2.append(L1[i]+L[i])
    L2.append(len(L)-len(L1))
    print L2
ChangeList()
``` | |
| | (f) | Observe the following program and answer the questions that follow:<br>import random<br><br>```python
import random
X=3
N = random.randint(1,X)
for i in range(N):
    print i,'#',i+1
```<br><br>   a.  What is the minimum and maximum number of times the loop will execute?<br>   b.  Find out, which line of output(s) out of (i) to (iv) will not be expected from the program?<br>     i.  0#1<br>     ii.  1#2<br>     iii. 2#3<br>     iv. 3#4 | 2 |
| 2 | a | Explain the two strategies employed by Python for memory allocation. | 2 |
| | b | Observe the following class definition and answer the questions that follow: | 2 |

```
class Info:
    ips=0
    def __str__(self):  #Function 1
        return " Welcome to the Info Systems"
    def __init__(self):
        self.__Systemdate=""
        self.SystemTime=""
    def getinput(self):
        self.__Systemdate = raw_input("enter data")
        self.SystemTime=raw_input("enter data")
        Info.incrips()
    @staticmethod    #Statement 1
    def incrips():
        Info.ips=Info.ips+1
        print " System invoked",Info.ips,"times"
I=Info()
I.getinput()
print I.SystemTime
print I.__Systemdate    # Statement 2
```

i. Write statement to invoke Function 1.

ii. On Executing the above code , Statement 2 is giving an error explain.

	c	Define a class PRODUCT in Python with the following specifications	4

Data members:

Pid   – A string to store productid.

Pname   - A string to store the name of the product.

Pcostprice – A decimal to store the cost price of the product

Psellingprice – A decimal to store Selling Price

Margin   - A decimal to be calculated as Psellingprice - Pcostprice

Remarks   - To store"Profit" if Margin is positive else "Loss" if Margin is negative

Member Functions:

- A constructor function to initialize All the data members with valid default values.
- A method SetRemarks() that assigns Margin as Psellingprice - Pcostprice and sets Remarks as mentioned below:

Margin	**Remarks**
<0 (negative)	Loss

>0(positive)	Profit

- A method Getdetails() to accept values for Pid,Pname,Pcostprice,Psellingprice and invokes SetRemarks() method.
- A method Setdetails() that displays all the data members.

	d	Answer the questions (i) to (iv) based on the following:	4

```
class Shop(object):
    def __init__(self):
        self.no_of_employees =0
        self.no_of_brands=0
    def getSdata(self):
        self.no_of_employees=input("Number of employees")
        self.no_of_brands=input("Number of brands")
    def showSdata(self):
        print self.no_of_employees
        print self.no_of_brands
class Brand (object):
    def __init__(self):
        self.name = ""
        self.category=["Mens","Womens","Kids"]
        self.avgprice=0.0
    def getdata(self):
        self.name = raw_input("Enter Brand Name")
        self.avgprice = input("Enter Average Price")
    def showdata(self):
        print self.name
        print self.category
        print self.avgprice

class Mall(Brand,Shop):
    def __init__(self):
        self.no_of_shops =0
    def getdata(self):
        super(Mall,self).getSdata()      # Statement1
        super(Mall,self).getdata()    # Statement 2
        self.no_of_shops = input("Enter number of shops")
    def showdata(self):
        print self.no_of_shops
        print self.no_of_brands
        _____      # Blank 1
```

		i. Which type of Inheritance is demonstrated in the above code?	
		ii. Explain Statement 1 and 2.	
		iii. Name the methods that are overridden along with their class name.	
		iv. Fill Blank1 with a statement to display variable category of class Brand.	
3	a	Consider the following unsorted list 95 79 19 43 52 3 Write the passes of bubble sort for sorting the list in ascending order till the 3rd iteration.	3
	b	Kritika was asked to accept a list of even numbers but she did not put the relevant condition while accepting the list of numbers. You are required to write a code to convert all the odd numbers into even by multiplying them by 2.	3

	c	Aastha wants to create a program that accepts a string and *display the characters in the reverse order in the same line using a Stack*. She has created the following code , help her by completing the definitions on the basis of requirements given below :
		class mystack:
		    def __init__(self):
		        self.mystr= _____ # Accept a string
		        self.mylist =_____ # Convert mystr to a list
		  # Write code to display while removing elements from the stack.
		    def disp(self):
		        :
		        :
			4

	d	Write a generator function generatesq() that displays the squareroots of numbers from 100 to n where n is passed as an argument .	2
	e	Evaluate the following Postfix expression: 20,10,-,15,3,/,+,5,*	2

4	a	Observe the following code and answer the questions that follow:
		File = open("Mydata","a")
		_____ #Blank1
		File.close()
		i. What type (Text/Binary) of file is Mydata?
			1

		ii. Fill the Blank 1 with statement to write "ABC" in the file "Mydata"	
	b	A text file "Quotes.Txt" has the following data written in it: Living a life you can be proud of Doing your best Spending your time with people and activities that are important to you Standing up for things that are right even when it's hard Becoming the best version of you Write a user defined function to display the total number of words present in the file.	2

	c	Consider the following class declaration and answer the question that follows:
		
		``python
		import pickle
		class Student:
		    def __init__(self):
		        self.name=""
		        self.percent=0.0
		    def inputdata(self):
		        self.name=raw_input("Enter Name")
		        self.percent=input("Enter Percentage scored")
		    def returnpercent(self):
		        return (self.percent)
		    def displaydata(self):
		        print "Name:",self.name
		        print "Percent:",self.percent
		``
		A
		nuj has been asked to display all the students who have scored less than 40 for Remedial Classes.
		Write a user defined function to display all those students who have scored less than 40 from the binary file "Student.dat" assuming it stores all the object of the class Student mentioned above.
			3

		Section – C	
5	(a)	Observe the table 'Club' given below:	2

Club

Member_id	Member_Name	Address	Age	Fee

M002	Nisha	Gurgaon	19	3500
M003	Niharika	New Delhi	21	2100
M004	Sachin	Faridabad	18	3500

i.   What is the cardinality and degree of the above given table?

ii. If a new column contact_no has been added and three more members have joined the club then how these changes will affect the degree and cardinality of the above given table.

(b) Write SQL commands for the queries (i) to (iv) and output for (v) to (viii) based on the tables 'Watches' and 'Sale' given below.   6

Watches

Watchid	Watch_Name	Price	Type	Qty_Store
W001	HighTime	10000	Unisex	100
W002	LifeTime	15000	Ladies	150
W003	Wave	20000	Gents	200
W004	HighFashion	7000	Unisex	250
W005	GoldenTime	25000	Gents	100

Sale

Watchid	Qty_Sold	Quarter
W001	10	1
W003	5	1
W002	20	2
W003	10	2
W001	15	3
W002	20	3
W005	10	3
W003	15	4

i. To display all the details of those watches whose name ends with 'Time'

ii. To display watch's name and price of those watches which have price range in between 5000-15000.

iii. To display total quantity in store of Unisex type watches.

iv. To display watch name and their quantity sold in first quarter.

v.   select max(price), min(qty_store) from watches;

		vi. select quarter, sum(qty_sold) from sale group by quarter; vii. select watch_name,price,type from watches w, sale s where w.watchid!=s.watchid; viii. select watch_name, qty_store, sum(qty_sold), qty_store- sum(qty_sold) "Stock" from watches w, sale s where w.watchid=s.watchid group by s.watchid;	
6	(a)	Correct the following boolean statements: 1. X+1 = X 2. (A')'=A' 3. A+A'=0 4. (A+B)' = A.B	2
	(b)	Draw the equivalent logic circuit for the following Boolean expression: (A.B)+C	1
	(c)	Write the POS form of a Boolean Function F, which is represented in a truth tale as follows: <table><tr><td>P</td><td>Q</td><td>R</td><td>F</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td></tr></table>	2
	(d)	Reduce the following Boolean Expression using K Map: $F(A,B,C,D)= \Sigma(0,1,3,5,6,7,9,11,13,14,15)$	3
7	(a)	Identify the type of topology on the basis of the following: 1. Since every node is directly connected to the server, a large	2

		amount of cable is needed which increases the installation cost of the network. 2. It has a single common data path connecting all the nodes.	1

	(b)	Expand the following:
		   a. VOIP
		   b. SMTP
			1

	(c)	Who is a hacker?	1
	(d)	The following is a 32 bit binary number usually represented as 4 decimal values, each representing 8 bits, in the range 0 to 255 (known as octets) separated by decimal points. 140.179.220.200 What is it? What is its importance?	1
	(e)	Daniel has to share the data among various computers of his two offices branches situated in the same city. Name the network (out of LAN, WAN, PAN and MAN) which is being formed in this process.	1
	(f)	Rehaana Medicos Center has set up its new center in Dubai. It has four buildings as shown in the diagram given below:	

Distances between various buildings are as follows:

Accounts to Research Lab	55 m
Accounts to Store	150 m
Store to Packaging Unit	160 m
Packaging Unit to Research Lab	60 m

Accounts to Packaging Unit	125 m
Store to Research Lab	180 m

Number of Computers

Accounts	25
Research Lab	100
Store	15
Packaging Unit	60

As a network expert, provide the best possible answer for the following queries:

i) Suggest a cable layout of connections between the buildings.   1

ii) Suggest the most suitable place (i.e. buildings) to house the server of this organization.   1

iii) Suggest the placement of the following device with justification:
    a) Repeater   b) Hub/Switch   1

iv) Suggest a system (hardware/software) to prevent unauthorized access to or from the network.   1