

- 817605
- (b) Define a class DXXMAT and perform the following : (Using the required member Data and Member Functions) 8
- (i) To read a matrix
 - (ii) To multiply two matrices
 - (iii) To display the matrices.
- (c) Explain run time polymorphism and compile time polymorphism with proper examples. 4
6. Define the following terms with examples : (any five) $5 \times 4 = 20$
- (i) Pure Virtual Functions
 - (ii) Multiple Inheritance
 - (iii) Data Abstraction
 - (iv) Container Class
 - (v) Overloaded Constructors
 - (vi) File Modes
 - (vii) Hybrid Inheritance.

Total No. of printed pages = 4 |

16 (CS 372) ADCP

Wish you good luck
2010 C
ADVANCE COMPUTING

Full Marks - 100

Pass Marks - 35

Time - Three hours

The figures in the margin indicate full marks for the questions.

Answer any five questions.

1. (a) Mention at least three important features of C++ programming that are different from C programming. Explain your answer using suitable examples. 6
- (b) What are the constructors and destructors in C++? Explain their use with suitable examples. 8
- (c) Specify an application and explain why object oriented design or a procedural design is suitable for it. Also state the reason for other design to be unsuitable. 4

[Turn over

(d) What is a Pointer ? Explain the difference between the Address operator '&' and Bitwise operator '&' with examples. 1+1=2

2. (a) With reference to Object Oriented programming (OOP), explain the terms *encapsulation* and *abstraction*. 2+2=4

(b) Write a *swap ()* function which exchanges two floating point values of x and y. Test this function for a = 22.2 and b = 44.4 as input and write down the corresponding output. 6

(c) What is data hiding in a program ? How is it implemented in C++? 3+3=6

(d) Write down the syntax of the following C++ keywords : 4

(i) switch (ii) for (iii) static (iv) dowhile.

3. (a) Write a program to accept a string and a character and print the number of times the character has occurred in that string. 4

(b) Give an example of the notation of virtual base class in C++. Illustrate what happens to your examples when the base class is not declared as virtual. 6

(c) Justify the need of the Scope Resolution Operator for accessing global variables with an example. 6

(d) Describe the role of the following function as useful debugging aids :
(i) perror (), (ii) perror (). 2+2=4

4. (a) What do you mean by static data members and static functions ? Mention the major properties of static data member and static functions. 4

(b) What is derived class ? How can a private member of a class be inherited ? Explain. 2+2=4

(c) Write a C++ program to concatenate two given strings using '+' operator (using overloading concept). 6

(d) What are Templates ? Write their syntax and usage. Design a function template in C++ to sort an array. 6

5. (a) For each of the following systems, identify the relative importance of the three aspects of modeling, namely Object, Dynamic and Functional modeling : (i) Telephone Answering Machines (ii) Printer. 4×2=8

✓ 6. Design two classes Polar and Rectangle to represent points in the polar(r , a) and rectangle (X , Y) systems. Use conversion functions to accomplish the following conversions : 20

- (i) $X = r \cos(a)$
- (ii) $Y = r \sin(a)$
- (iii) $a = \tan^{-1}(Y/X)$
- (iv) $r = \sqrt{X^2 + Y^2}$

7. (a) Differentiate between structures and classes.

(b) Write a program to write the name, age, semester and branch of 5 different students to a data file *output.txt*. Next read the records from the file and display all the records. Also display the name of the eldest student.

(c) What are constructor and destructors ?

Explain with example. Is it a must to use constructor ? What is copy constructor ? Give example of copy constructor.

$$2+8+10=20$$

✓ 8. Write short notes on :

$$5 \times 4 = 20$$

- (i) Templates in C++
- (ii) Exception handling in C++
- (iii) Types of inheritances
- (iv) Virtual functions.

Total No. of printed pages = 4

16 (CS 372) ADCO

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2010

ADVANCED COMPUTING

Full Marks - 100

Pass Marks - 35

Time - Three hours

The figures in the margin indicate full marks for the questions.

Answer any five questions.

- ✓ (a) Define class and object with example.
- (b) List the salient features of Object Oriented Programming (OOP) and explain properly.
- (c) What do you mean by function overloading ? Give an example.
- (d) Define operator overloading. Write a function to represent complex numbers which have real and imaginary parts. Implement the member functions :
- (i) *setComplex*
 - (ii) *printComplex*

- (iii) addition of two complex numbers using operator (+) overloading and
- (iv) addition of two complex numbers using operator (*) overloading. $3+7+3+7=20$
- ✓ 2. (a) Explain the importance of access specifiers *protected* and *private*.
- (b) Using linked list implement the functions :
- (i) *addAtBeginning* ()
 - (ii) *append* ()
 - (iii) *addAfter* () and
 - (iv) *searchItem* ()

Also print the position of the item in the list if present. Write a main function to show how the functions work. $4+16=20$

3. (a) Define static data member. List its properties. What is abstract class ? Give an example. What is the use of *this* pointer in C++ ?
- (b) Design a class Student which has the following members : *rollNumber*, *setRollNumber*(), *printRollNumber*(). Design another class Marks having the following members : *sub1Marks*, *sub2Marks*, *set*

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(2)

Marks(), *printMarks*(). Design one more class Result with the following members : *total*, *printResult*(). Derive Marks from Student. Then derive Result from Marks and call all the member functions of the base classes from within the *printResult*() to display the final results of a student.

Write a main function to show how your design works. $10+10=20$

4. (a) When is virtual base class necessary ? Explain with an example.
- (b) Write a program to count the number of characters, spaces, tabs and lines in a text file and display the count.
- (c) Write a program to enter the records of 10 students in a file named '*student.txt*'. Then read the data from the file and display the record of the youngest student.

$6+7+7=20$

- ✓ 5. Design a class MATRIX. Then implement the following using member functions : 20
- (i) To read a matrix
 - (ii) To add two matrices
 - (iii) To multiply two matrices
 - (iv) To display a matrix.

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(3)

[Turn over]

Total number of printed pages - 5

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16 (CS 372) AD

2011

ADVANCE COMPUTING

Full Marks : 100

Pass Marks : 35

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer Q. no 1 and any four from the rest.

1. (a) Define string. What is the difference between following two statements ? $2 \times 10 =$

Char * Ch = "HELLO" ;

char ch [] = "HELLO" ;

(b) What do you mean by function overloading?

(c) Are the expressions *Ptr++ and ++*P same? Justify your answer.

Contd.

(12)

- (a) What is the difference between dynamic memory allocation and static memory allocation?
- (e) What is the name of structure when it contains a pointer to itself? Give example of such structure.
- (f) What is the use of "rb" in fopen() function used below?

FILE *fp ;

fp = fopen ("source.txt", "rb");

- (g) Why array is called derived data type?
- (h) What is the advantage of passing argument by reference?
- (i) What is inline function? Give example.
- (j) Is for loop faster than while loop? Justify your answer.
- (k) What is generic pointer? Give example.
- (l) What is the constructor in object oriented programming?

(13)

- (2) Write a program to implement the following functions using linked list: $5 \times 4 = 20$
- (a) To insert an element at the beginning of a linked list
 - (b) To delete an element from the end of the list
 - (c) To search an element in the linked list
 - (d) To count the no. of elements in the linked list.

- (3) (a) What is class? How does it accomplish data hiding? 8
- (b) What is friend function? What are the characteristics of friend function? Write a program to show the use of friend function. $2+5+5=12$

- (4) (a) When is virtual base class necessary? Explain with an example. 6
- (b) Write a program to count the number characters, spaces, tabs and lines in a text file, and display the count itemwise. 6
- (c) What is polymorphism? 2

.....
.....

2+2
20 77
(d) What is exception handling? Explain the use of try-catch block in exception handling with the help of a program. 6

5. (a) Write a program to overload unary minus operator. 4

(b) What is abstract class? 2

(c) What are the different control structures in C++? 6

(d) Write a program to read some integers from the keyboard and count the no. of zeroes, positive and negative integers display the result. 8

6. Design a class MATRIX. Now implement the following using member functions: $5 \times 4 = 20$

(a) To read to Matrix

(b) To add two Matrices

(c) To multiply two Matrices

(d) To display two Matrices.

7. (a) What are the advantages of object oriented programming paradigm?

(b) Design a class STRING. Use operator overloading technique and do the following

(i) Use '=' to copy one string to other

(ii) Use '+' to join two strings.

(iii) Use '^' to show common symbols of two strings.

00 00
10 10
a 5
2 3
if (i=0)
{
 for (j=1; j<=n; j++)
 cout << a[j] << " ";
 cout << endl;
}
else if (i>0)
{
 for (j=0; j<=i-1; j++)
 cout << a[j] << " ";
 cout << endl;
}
else if (i<0)
{
 for (j=0; j<=n-1-i; j++)
 cout << a[j] << " ";
 cout << endl;
}
cout << endl;
cout << endl;

7. Write short notes on any *four* from the following :
 $5 \times 4 = 20$

- (i) Exception handling
- (ii) PPL Vs OOPL
- (iii) Virtual base class
- (iv) Inline functions
- (v) This pointer
- (vi) Pure virtual functions
- (vii) Basic data types in C++.

Total No. of printed pages = 4

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16 (CS 372) ADCO

2012 C

ADVANCED COMPUTING

Full Marks - 100

Pass Marks - 35

Time - Three hours

The figures in the margin indicate full marks
for the questions.

Answer any *five* questions.

1. Write a program to implement the following using linked list :
 $5 \times 4 = 20$
 - (a) To add an element at the end of a linked list
 - (b) To delete an element at the end of list
 - (c) To search an element in the list
 - (d) To display the list.

2. (a) Design a class to read a list of n integers, then display the list in ascending order. Use the following members : 12

- (i) Int n
- (ii) Read List ()
- (iii) Sort List ()
- (iv) Display ()

(b) What are templates ? Design a function template in C++ to sort an array. 2+6=8

3. Design a class MATRIX to implement the following : 20

- (a) To read a matrix
- (b) To add two matrices
- (c) To multiply two matrices
- (d) To display the matrix.

4. (a) What is an operator overloading ? State the differences between operator overloading and function overloading. Create a class FLOAT that contains one float data member. Overload all the four arithmetic operators so that they operate on the objects of FLOAT.

2+3+10=15

(b) What is a friend function ? How friend functions are useful ? 2+3=5

5. (a) What do you mean by inheritance ? Can reusability be explained with the help of inheritance ? Explain with the help of diagrams different types of inheritance. 2+2+10=14

(b) How do the properties of the following two derived classes differ ? 2+2+2=6

- (1) class D1 : private B { }
- (2) class D2 : public B { }

What is a virtual class ? When do we make a class virtual ?

6. (a) What is a constructor ? Is it mandatory to use constructor in a class ? Describe the importance of destructors. What is a copy constructor ? Give an example of a copy constructor. 2×5=10

(b) Write a program to count the number of chars, spaces, tabs and newlines in a file. 10

Total No. of printed pages = 7

16 (CS 372) ADCO

2012

ADVANCED COMPUTING

Full Marks - 100

Pass Marks - 35

Time - Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and any *four* from the rest.

1. (a) # include <stdio.h> $2 \times 10 = 20$
int main()
{
 char c[] = "IPLT20";
 char *P = ~~C~~ ;
 print f ("%s", p+p[3] - p[1] - 1) ;
 return 0;
}

Write the output of the above program.

[Turn over

Kupamnath 497 @gmailec

(b) What do you mean by Self Referential structure ? Give an example.

(c) Write the syntax for the copy constructor in C++.

(d)

Book	
-	name : char*
-	stock : int
+	is Available () : bool
+	issue ()

For the above figure, write the equivalent code in C++.

(e) Why do we need to overload the existing operators in C++ whose meaning is already defined ?

(f) $p = \text{fopen}(\text{"hello.text"}, \text{"w"})$;
and

$p = \text{fopen}(\text{"hello.text"}, \text{"w+"})$;

Are the statements same ? Justify.

(g) (i) Statement I : Memory area of a member function is same for all the objects of that class.

II
Statement II : Memory area of a member is same for all the objects that class.

Write the correct statement(s).

(ii) Statement I : Constructor of a Derived class is executed first, then that of Base class.

Statement II : Destructor of a Base class is executed first, then that of Derived class.

Write the correct statement(s).

(h) Consider the following code segment. Find errors(s) if any.

Class xyz

{

int a ;

public ;

int b, c ;

.....

void f() { cont<<c<<b<<a ; }

.....

}

.....

main ()

```

{
    xyz p;
    p.a = 2 ;
    p.b = 3 ;
    p.c = 4 ;
    .....
}

```

- (i) What is "Base address" of an array ? How pointer can be associated with base address? 1+2+2=5
- (j) What do you mean by polymorphism in C++? How are they achieved ?
2. (a) What is an array ? Mention one merit and one demerit of array over linked list. Can a singly linked list be traversed in both the directions. 1+2+2=5
- (b) Write a program to implement the following functions using singly linked list. 5×3=15
- (i) To inset an element at the end of the list
 - (ii) To delete the first element.
 - (iii) To display the second last element of the list.
3. (a) What do you mean by class in object oriented programming language? How is class different from structure? Mention any two advantages of OOP over POP. 1+2+2-5
- (b) What is Constructor ? What are its types? Give syntax. 5
- (c) Write C++ code for designing a class 'city' with data members "Name", "Pincode", "Mayor". Also write member functions to take and display data members. You may consider additional members of the class if required. 10
4. (a) What do you mean by friend function? What is its importance? How does it differ from member functions ? 1+2+2=5
- (b) Design two classes A and B to store the cost of an item in Rupees and Dollar respectively. Write a common friend function to both the classes to find the costlier item. [Assume 1 Dollar = 54 Rupees] 8
- (c) Write a program to open a file in read only mode and then to calculate number of times the first letter of your name appears in that file. 7

5. (a) What is inheritance in OOP? Mention its types and importance. 5
- (b) "We can overload all existing operators in C++". True/False ? Justify your answer. 3
- (c) Write a program to design a 'Distance' class with data members "feet" and "inch". Write functions to overload the following operators.
- + To add two Distance objects
 - == To compare two Distance objects to find the greater one
 - = To copy the values of one object to another. 12

6. (a) "Class is an Abstract Data Type". Explain. 2
- (b) Write any two differences between functional design and object oriented design. 2
- (c) Write a C++ program to handle array out-of-bound exception. 7
- (d) Write a template function to sort an array of elements. Write a C++ program to instantiate the same by integer and character datatype. 9

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(6)

7. Write short notes on : 5x4
5x4
- (a) Generic programming and generic pointers
- (b) Exception handling in C++
- (c) Characteristics of OOP
- (d) Garbage collection and its importance.

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(7)

7. (a) Why templates are used? What are the types? Give example of each. $2+2+6=10$

Total number of printed pages-4

(b) How exceptions are handled in C++? Explain with an example. $4+6=10$

16 (CS 372) ADCO

2013

8. Write short notes on *any four* of the following :

$$5 \times 4 = 20$$

- (i) Run time polymorphism
- (ii) File modes
- (iii) Function Overloading
- (iv) This pointer
- (v) Pure virtual functions
- (vi) C++ streams
- (vii) Generic pointer

ADVANCED COMPUTING

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer any five questions.

1. (a) Design a class ARRAY. Then implement the following using member function : 12
 - i. To read an array
 - ii. To add two array
 - iii. To display a matrix

Allocate the memory of array dynamically.

- (b) Differentiate between class and structure.

3

(c) What are the basic data types supported by C++? What is void data type? $3+2=5$

2. (a) Write a program to implement the following using linked list : $5 \times 3 = 15$

(i) To add an element at the beginning of a linked list

(ii) To delete an element at the end of the list

(iii) To display the list

(b) List the Salient features of Object Oriented Programming (OOP). 5

3. (a) What is inline function? State the advantage of using inline function. Write a program using inline function. How inline function can be defined inside and outside of a class? $2+2+3+3=10$

(b) What is a constructor? What are the different types of constructor? Give example of each. How constructor function can be called implicitly and explicitly in a program?

$$2+5+3=10$$

4. (a) What is a friend function? How friend functions are useful? $2+4=6$

(b) What do you mean by inheritance? What is its advantage? Explain with the help of diagrams different types of inheritance? How protected data member behaves within a class and in the derived class?

$$2+3+6+3=14$$

5. (a) Design a class COMPLEX which has two data members : *real, img*. Overload the + operator to add two COMPLEX objects. Use necessary member functions. 10

(b) When is virtual base class necessary? Explain with an example. 10

6. (a) What is static data member? State the characteristics of static data members. Write a program to show the use of static data member. $2+3+5=10$

(b) Write a program to write the code, name and price of 3 different items to a data file *item.txt*. Next read the records from the file and display all the records. Also display the name of the lowest price item. Use stream object. 10

- (b) Differentiate between structured programming and object-oriented programming. 4
- (c) Explain the key features of object-oriented programming. 10

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16 (CS 372) ADCO

2014

ADVANCED COMPUTING

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Part - A

(Each question has only one correct answer)

$$10 \times 2 = 20$$

1. Constructors have the same name as
 - (a) The class they belong to.
 - (b) The current file name.
 - (c) The data members of the class.
 - (d) Class name and preceded by ~.

2. The keyword operator is used to overload an
 (a) Operator.
 (b) Function.
 (c) Class.
 (d) Template.
3. Identify the access specifier from the following
 (a) Public.
 (b) Virtual.
 (c) Void.
 (d) Class.
4. The virtual keyword solves the
 (a) Ambiguity in the base class.
 (b) Ambiguity in the base class and derived class.
 (c) Ambiguity in the derived class.
 (d) None of the above.
5. Choose the correct template definition :
 (a) template<class T>.
 (b) class<template T>.
 (c) <template T>.
 (d) template class< T>.
6. Exception is generated in
 (a) Try block.
 (b) Catch block.
 (c) Throw block.
 (d) All of the above.
7. Which is the correct way to declare a pointer ?
 (a) int *ptr.
 (b) * int ptr.
 (c) int ptr*.
 (d) int_ptr x.

Part - B

(Answer any 2 questions)

8. A union member variable is generally accessed using the
(a) Address operator.
(b) Dot operator.
(c) Comma operator.
(d) Ternary operator.
9. The EOF is equivalent to
(a) 1
(b) 0
(c) -1
(d) None of the above.
10. A structure can be placed within another structure and is known as
(a) Self-referential structure.
(b) Nested structure.
(c) Parallel structure.
(d) Pointer to structure.
11. (a) What is a pointer ? What are the advantages of using pointers . 2+3=5
(b) What is an array of pointers ? What are the drawbacks of using pointers ? 2+3=5
(c) Explain dynamic memory allocation. Write a program to display the elements of a 2-d matrix. 2+4=6
12. (a) Write a program to enter the details of employees (employee code, name, working hours and salary) in a file named "employee.txt" and read the contents of the same file to display it on the screen. 8
(b) Write a program to read the contents of a file and copy the contents into a different file. 8
13. (a) Differentiate between a class and a structure. 4

(b) Write functions of each of the following to be performed on a linked list : (take necessary arguments for each of the functions) $3 \times 4 = 12$

- (i) To add an element in an user-defined position .
- (ii) To delete an element from the end.
- (iii) To count the no. of elements in the list .

Part - C

(Answer any 3 questions)

14. (a) What is a template ? What is the need of using templates ? Write a function for sorting integers and floating numbers . (Use templates) $2+3+3=8$

(b) What do you mean by exception handling ? How can the exceptions be classified ? Describe the role of the keywords try, catch and throw in exception handling . $2+3+3=8$

15. (a) What is an abstract class ? 2
 (b) What is polymorphism ? What is early binding and late binding ? $2+2+2=6$
 (c) What do you mean by inheritance ? What are the different types of inheritance ? What is the role of various access specifiers during inheritance ? $3+3+2=8$

16. (a) Write a program to add 2 complex numbers and display their result. (Use operator overloading) 4

(b) Write a program to calculate the sum of integers from 2 different classes using a friend function . 4

(c) Write a program to find the area of a square, rectangle, triangle and circle using function overloading. 4

(d) Write a program to show the use of a copy constructor. 4

17. (a) Write an inline function to find the cube of a number. 2

3. Write short notes on : **(any four)** $5 \times 4 = 20$
- (a) Object Oriented Design
 - (b) Data Types in C++
 - (c) Call by Value and Call by Reference parameter passing
 - (d) Inline function and Virtual function
 - (e) Destructors
 - (f) Virtual Base Class.

Total number of printed pages - 4

16 (CS 372) ADCO

2015 C

ADVANCED COMPUTING

Paper : CS 372

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and **any four** from the rest

1. (a) Differentiate between procedural programming and object oriented programming.
- (b) Write four characteristics of friend function.
- (c) Differentiate between structure and class. What is self referential structure ? Give example.

Contd.

- (d) Write a function to insert an element at the end of a linked list.
- (e) Write a function to delete an element from the beginning of a linked list.
- $4 \times 5 = 20$
2. (a) What are the various properties of Object Oriented Programming? 8
- (b) Design a class STRING. Use operator overloading technique and do the following : 12
- (i) Use '=' to copy one string to other.
 - (ii) Use '+' to join two strings
 - (iii) Use '^' to show common symbols of two strings.
3. (a) What is constructor? Write a program to explain the use of all the types of constructors. 2+10=12
- (b) Design a class Integer with following functionalities 8
- (i) read ()
 - (ii) sort ()
 - (iii) display ()
- Use the necessary data members and member functions according to your requirement.
4. (a) Write a program to read some integers from the keyboard and store their squares in a file square.txt 10
- (b) What is inheritance? Explain all the types of inheritance with example. 2+8=10
5. (a) Write a program to demonstrate run time polymorphism. 10
- (b) What is exception handling? Explain the use of try-catch block in exception handling with the help of proper diagram and program. 10
6. (a) What is generic programming? How is it implemented in C++? 10
- (b) Write a program using class template to find the scalar product of two vectors. 10
7. (a) Write a program to demonstrate single inheritance. 10
- (b) Explain the file operations and file modes in C with example. 10

- (b) Write any six characteristics of constructors. 6
- (c) What do you mean by inheritance? Explain all the types of inheritance with proper diagram. 8
7. Write short notes on : (any four) $5 \times 4 = 20$
- (d) Characteristics of friend function
- (b) Virtual functions and their importance
- (c) Rules for operator overloading
- (d) Types of Constructors
- (e) Water-fall model of type conversion
- (f) Class and Object.
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Total number of printed pages - 8

16 (CS 372) ADCO

2015

ADVANCED COMPUTING

Paper : CS 372

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any four from the rest.

1. (a) State True or False $1 \times 10 = 10$
- (i) It is possible to have multiple instances of an object to co-exist without any interference.
 - (ii) Template functions can not be overloaded.
 - (iii) fseek() function can not be used to move the file pointer in backward, for that we need rewind() function.

Contd.

- (x) Exceptions are of two types _____ and _____
2. (a) Write a program to read some integers from a file and then find the odd and even numbers. Write the even numbers in a file Even.txt and odd numbers in a file Odd.txt. 8
- (b) Write a program to implement the following functions for a linked list
 void append(int), void addAtBeginning(int), int deleteNode(int),
 void display(). 12
3. (a) Design two classes polar and rect which will convert rectangular co-ordinates to polar co-ordinates and vice versa. Use following functions as friend function in both the two classes;
 friend rect convertP2R(polar), friend polar convertR2P(rect). 12
- (b) Create a base class called SHAPE. Use this class to store two "double" type values that could be used to compute

the area of figures. Derive two classes called TRI and RECT from base SHAPE. Add to the base class a member function ReadData() to initialize base class data members and another member function showArea() to compute and display the area of figures. Make showArea() a virtual function and redefine this function in the derived classes to suit their requirements. Now write a program using these three classes that will accept dimensions of a triangle or rectangle and display their areas. 8

- (a) Assume that a bank maintains two kinds of accounts for customers, one called as savings account and the other as current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class account that

- (iv) A virtual function can be a friend of another class.
- (v) Run time polymorphism is achieved only when a virtual function is accessed through a pointer to the base class. It can not be achieved using object name along with the dot operator to access virtual function.
- (vi) A static member is visible only within the class, but its life time is the entire program.
- (vii) Friend function can not be declared in the private part of a class.
- (viii) Using function pointer we can refer the address of a constructor.
- (ix) Friend function can not be used to overload = (assignment operator).
- (x) The member functions of a derived class can directly access only the public and private data.

(b) Fill in the blanks $1 \times 10 = 10$

- (i) In OOP, a problem is considered as a collection of a number of _____.
- (ii) _____ means that the code associated with a given procedure is not known until the time of the call at run-time.
- (iii) _____ function disconnects a file pointer from a file.
- (iv) C++ is a _____ of C language.
- (v) _____ data type is used for the declaration of generic pointers.
- (vi) The variables declared inside the class are known as _____ and the functions are known as _____.
- (vii) When a function is defined inside a class, it is treated as _____.
- (viii) The pointer *this* acts as an _____ argument to all the member functions.
- (ix) A class containing a pure virtual function is called _____.

stores customer name, account number and type of account. From this derive the classes `cur_acct` and `sav_acct` to make them more specific to their requirements. Include necessary member functions in order to achieve the following task : 12

- (i) Accept deposit from customer and update the balance.
- (ii) Display the balance.
- (iii) Compute and deposit interest.
- (iv) Permit withdrawal and update the balance.
- (v) Check for the minimum balance, impose penalty, necessary, and update the balance.

(b) Design a class COMPLEX. Use operator overloading to perform the following :

- (i) Use '+' to add two complex numbers.
- (ii) Use '*' multiply two complex numbers.

To solve (iii) Use '++' to increment both the real and imaginary part by one unit.

5. (a) Why do we need exception handling? Explain the use of try-catch block in exception handling with the help of a program. 7

(b) Design a template function to sort any five numbers, (i.e. numbers may be integers, floating point etc.) 5

(c) Write a class template to represent a generic vector. Include member functions to perform the following tasks :

- (i) To create a vector
- (ii) To modify the value of a given element
- (iii) To multiply by a scalar value
- (iv) To display the vector in the form (x, y, z) . 8

6. (a) Differentiate between procedure oriented programming and object oriented programming. 6

- b) Steps of Object Oriented Analysis
 c) File handling in C++
 d) Functions supported by the **string** class.

Total number of printed pages-6

16 (CS 371) OOPR

2015

OBJECT ORIENTED PROGRAMMING

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer question no. 1 and any four from the rest.

1. 4×5=20

- a) Differentiate between Object Oriented Programming and Procedure Oriented Programming.
- b) Write any five characteristics of constructor.
- c) What is the significance of static members and member functions in Object Oriented Programming ?

d) What is inline function ? Give example.

e) Virtual functions cannot be static.
Justify the statement.

a) Write a program to design a class VECTOR and copy the contents of one VECTOR to another using a copy constructor. 10

b) Define two classes POLAR and RECT to represent points in the polar and rectangle systems. Use conversion routines to convert from one system to the other. 10

a) Write a program to multiply two complex numbers, using a class called COMPLEX and the multiplication function should be friend COMPLEX multiply (COMPLEX, COMPLEX) 10

b) Write a program to multiply a vector with scalar and a scalar with a vector using operator overloading technique. 10

4. a) Write a program to show the overloading of the input ($>>$) and output ($<<$) operator. 10

b) In the following scenario four different classes are shown :

```
class Student
{
protected:
    int rollNumber;
public:
    void inputRollNumber();
    int getRollNumber();
};

class Music
{
protected:
    int musicMarks;
public:
    void inputMusicMarks();
    int getMusicMarks();
};

class Test
{
protected:
    int sub1, sub2;
public:
    void inputMarks();
    int getTotalSubMarks();
};

class Result
{
protected:
    int total;
public:
    void result();
};
```

class Test and Music are derived from student in public mode, class result is derived from both Test and Music in public mode. Write a program to accomplish this task, you are not allowed to write any new member functions. 10

5. a) There is a class **Person** having data members name and age, another class **Employee** which is derived from **Person** having data members e_id and pay. Use necessary member functions and derivation mode which will be suitable for you to complete the program.

10

- b) Create a base class called **Shape**. Use this class to store two **double** type values that could be used to compute the area of figures. Derive two specific classes called **triangle** and **rectangle** from the base **Shape**. Add to the base class, a member function **get_data()** to initialize base class data members and another member function **display-area()** to compute and display the area of figures. Make **display_area()** as a virtual function and redefine this function in the derived classes to suit their requirements.

Using these three classes, design a program that will accept dimensions of a triangle or a rectangle interactively, and display the area.

Remember the two values given as input will be treated as lengths of two sides in the case of rectangles, and as base and height in the case of triangles, and used as follows :

$$\text{Area of rectangle} = x * y, \text{ Area of triangle} = (1/2) * x * y$$

6. a) Design a function template to sort group of any data type. 10

- b) What is exception ? Write a program to handle array index out of bound exception. 10

7. Write short notes : (**any two**) $2 \times 10 = 20$

- a) Object Oriented Notations and Graphs

Total number of printed pages-3

16 (CS 371) OOPR (N)

2017 C

OBJECT ORIENTED PROGRAMMING

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer any five questions.

1. a) Write a program to add and multiply two complex numbers. Use necessary data members and member functions.

10

- b) Design a class to read name, roll number, class and age of "n" number of students then display the following:

i) The whole records.

ii) The youngest and eldest student.

10

Contd.

2.

a) What is friend function? How it helps in programming? Write any five characteristics of friend function.

$$2+3+5=10$$

3.

a) Explain all the characteristics of OOP.

$$10$$

b) What is static data members? Write a program to explain the use to static data members by showing the output of the program.

$$3+7=10$$

4.

a) Define a class STRING. Use overloaded == operator to compare two strings.

$$10$$

b) Create a class FLOAT that contains one float data members. Overload all the four arithmetic operators so that they operate on the objects of FLOAT.

$$10$$

5.

a) Write a program to explain multiple inheritance.

$$10$$

CJ

b)

What are the visibility of inherited members in the derived classes? Explain with a neat diagram.

$$3+7=10$$

6.

a) What is pure virtual function? Write any six rules for pure virtual function.

$$4+6=10$$

b)

What is exception? Write a program to show handling of exception.

$$2+8=10$$

7.

a) What is template? Explain how it helps in generic programming.

$$3+7=10$$

b)

Design a class template to sort any set of input data.

$$10$$

8.

a) Write short notes on : (any two)

$$2 \times 10 = 20$$

a)

Inline function and function overloading

b)

Call by Value and Call by Reference

c)

Stepwise installation procedure of LINUX

d)

Virtual Base Class.