Ref. No. Ex/CSE/PC/B/T/214/2024

BCSE 2nd Year 1st Semester Examination, 2024

Programming Fundamentals and Object Oriented Concepts

Full marks: 100 **Time: 3 hours**

Group A [CO1]: 15 Marks

1) a) Describe the advantages and disadvantages of using a function. 3

b) Compare pointer to a function and a normal pointer. 3

c) Compare an array and structure in C. What is a self referential structure in C? 3

d) Write down the code snippet (whole program not required) in C to implement a 2D array with suitable pointer to pointer. 3

e) Consider a pointer to an array of 10 elements. Write down the code snippet (whole program not required) in C to implement a 2D array of number of rows provided at run time. 3

Group B [CO2]: 10 Marks

2) a) A file contains records of fixed length. Write down a code snippet in C to determine number of records without sequentially traversing the records. 3

b) An employee file contains employee code, name, dept code (in which department he/she works) designation and salary of all the employees. Consider, it is a binary file, all the records are of same length and records are ordered according to dept code. Write down the code in C to display the dept code for each department and total salary of the employees working in the corresponding department. 7

Group C [CO3]: 30 Marks

Attempt any three

3) a) Explain encapsulation and inheritance in the context of object oriented programming. 4

b) Assume MyClass is a class. Explain, what supports are needed for the following:

```
MyClass obj1, obj2;
MyClass obj3=obj1;
obj2=obj1;
```

3

c) A member function of a class (Say, class A) needs to work with the private members of an object of another class (Say, class B). This can be achieved by making the function friend of B or by providing public member functions in B to deal with its private members. Compare these two approaches. 3

4) a) Compare a pointer and reference variable in C++. 2

b) Compare function overloading, function overriding in C++. 3

c) Say, class A inherits from class B and C. B and C inherit from D. What problem it gives rise to? What will you do to solve it and how does system solve it? 5

5) a) Comment on the size of an object in C++ and explain. 3

b) Consider class A has been derived from class B. Consider, p is of type B* and obj is an object of A. If a function is invoked i) using obj and ii) using p -- how the function calls will be resolved? 5

c) Describe a scenario to overload assignment operator explicitly. 2

6) a) State the utility of static members in a class. 4

b) Why do we need virtual destructor? 3

c) Write short notes on exception handling. 3

Group D[CO4]: 30 Marks

Attempt any two

7) a) Consider a system that maintains a list of students. For each student, roll, name, and score are stored. Given a roll, details of the student (if present) will be displayed. One can update the marks for a given roll (if it is present), one can find out the highest mark, one can display the name of successful students (score>=50). **Design the necessary classes and implement the same in C++.** 8

b) Consider a system as follows.

Each account has account number and balance amount. A list of account is to be maintained where one can add and find account, display information of all accounts. While adding, account number must be unique. Withdraw object has account number (must exist) and amount (will not exceed balance amount of corresponding account). Withdraw object will update the balance of corresponding account in the list. User will be able to search and view account, add account and withdraw money from the account. **Design the necessary classes with brief description. Code is not essential.** 7

8) a) Consider the following system.

To handle the course allotment process, a list of applicants with their application id, name, score and choices (one can provide multiple choices according to their preference) are to be maintained. A course list is also maintained that keeps course id, course name and number of seats for every course. Applicants with higher score will get the priority. Allotment of an applicant with higher score will be made before considering an applicant with lower score. Subjected to the seat availability, an applicant is offered the best fitted course from his/her choice list. System keeps the information which applicant has been allotted which course. **Design the necessary classes with brief description. Code is not essential.** 8

b) Design a MyString class to enable the specification of string size and memory allocation at the time of object declaration and creation. If an object is initialized with another object then both will share the same copy of the string data. Same is followed for the case of assignment. Take care to handle the issue of object destruction. **Design the class and implement the same in C++.** 7

9) Employee information (**unique** emp-id, name, salary, dept-id in which he/she works) are to be stored in emp.dat file. In emp.dat file records are appended. The system must support the following: adding employee record, displaying all employee records for a given dept_id, searching an employee corresponding to emp-id provided by the user, update salary of an employee corresponding to emp-id provided by the user. **Design the classes and write down the code to implement.** 15

Group E [CO5]: 15 Marks

10) a) A member function of a class template that does not work with any generic type is also a function template. Why is it so? 2

b) Along with a function template there is an overloaded version of same function with specific parameter type(s). How the call for such function is resolved? 3

c) What is the use of namespace? In an application, most of the elements of two different namespaces will be used. For certain common identifiers you need to use the same from a specific namespace. How will you handle the situation? 4

d) Compare map and hashmap provided by C++ STL. 2

e) Consider any one algorithm provided by C++ STL. Explain the same and discuss with an example how will you customize it? 4