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Number of Printed Pages—4 **CS–501**

B. TECH. (Computer Sc. & Engg.)

FIFTH SEMESTER EXAMINATION, 2002-2003

OBJECT-ORIENTED PROGRAMMING USING C++

Time : Two Hours *Total Marks : 50*

Note : Attempt ALL the questions.

1. Answer any FOUR of the following :— (3½×4=14)

(*a*) Prepare an object model to describe a directed graph. Use direction as a qualifier in your diagram so that it is possible to determine the vertex that is connected to the head or to the tail of each edge.

(*b*) Explain Generalization with a suitable example.

(*c*) Prepare a class diagram from the instance diagram (Fig. 1).

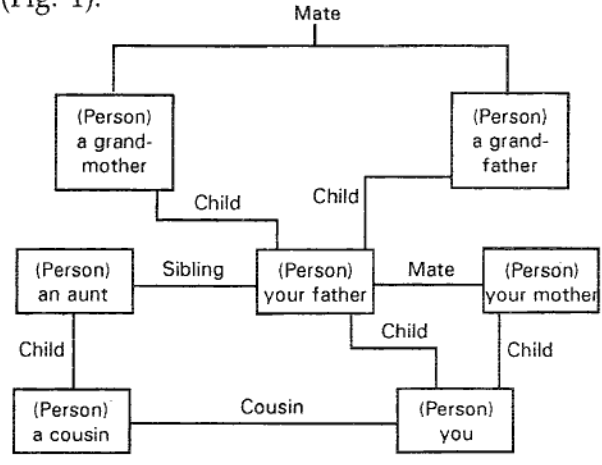

Fig. 1

(*d*) How is an association modeled as a class ? Explain with a suitable example.

(*e*) Explain multiple inheritance and multilevel inheritance with suitable examples.

(*f*) Draw an object model defining abstract and concrete classes.

2. Answer any TWO of the following :— (6×2=12)

(*a*) Describe States and Events.

Prepare a State diagram of a simple digital watch that has a display and two buttons to set it, the button *A* and the button *B*. The watch has two modes of operation, display time and set time. In the display time mode, hours and minutes are displayed, separated by flashing colon. The set time mode has two submodes, set hours and set minutes. The button *A* is used to select modes. Each time it is pressed, the mode advances in the sequence : display, set hours, set minutes, display etc. Within the submodes, the button *B* is used to advance the hours or minutes once each time it is pressed. Buttons must be released before they can generate another event.

(*b*) Prepare a dataflow diagram for computing the volume and surface area of a cylinder. Inputs are height and radius of cylinder, outputs are volume and surface area. You can use any arbitrary formula for demonstration. Discuss the several ways of implementing the DFD.

(*c*) During analysis phase of OMT, object model, functional model and dynamic model are prepared. Describe contents of these models.

3. Answer any FOUR of the following :— (3 × 4 = 12)

(*a*) Write a C++ program to assign some values to the member of class objects using pointer structure (—>).

(*b*) Write a C++ program to display a series of Fibonacci numbers without using the constructor.

(*c*) Explain, how data conversion is done from one class to another class type in C++ with an example.

(*d*) A friend function cannot be used to overload the assignment operator =. Explain, why.

(*e*) Distinguish between Data abstraction and Data encapsulation.

(*f*) Write a C++ program to generate a series of Fibonacci numbers using a copy constructor.

4. Answer any TWO of the following :— (6 × 2=12)

(*a*) Create a string class with the following data members :—

(*i*) Pointer to C string

(*ii*) Actual length of C string

Define the following operations on string object :—

(*i*) Overload = = (equality) and = (assignment) operators.

(*ii*) Overload + operator to concatenate the strings.

(*iii*) Overload stream operator << and >>.

(*b*) Discuss client-server relationship among classes. Using this relationship, define a base class called Shape. Derive three specific classes called circle, rectangle and triangle from the base class shape. Introduce member functions to initialize the different shapes and to compute the area of the shapes.

(*c*) Discuss different stream classes for file operations provided in *f*stream. *h* with their class hierarchy. Also explain the various file pointers and their manipulators.