THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY
COMPUTER SCIENCE & ENGINEERING DEPARTMENT
Semester : July –Dec 2006

Course Code : CS-019
Course : Object Oriented Analysis & Design

Max. Marks : 45
Time : 3 Hours

Note : 1) All questions are compulsory.
2) Attempt all parts of a question sequentially at one place.

1. A common problem encountered in digital system is data corruption due to noise or hardware failure. One solution is to use cyclic redundancy code (CRC). When data is stored or transmitted, a code is computed from the data and appended to it. When data is retrieved or received, the code is recomputed and compare with the value that was appended to the data. A match is necessary but not sufficient to indicate that the data is correct. The probability that errors will be detected depends on the sophistication of the function used to compute the CRC. Some functions can be used for error correction as well as detection. Parity is an example of a simple function that detects single bit errors. The function to compute a CRC can be implemented in hardware or software.

For subsystems given as follows (a,b,c), decide whether or not a CRC is needed. If so, decide whether to implement the CRC in hardware or software. Justify your answer –

    a) Floppy disk controller   2

    b) Magnetic tape drive   2

    c) Validation of an account number   2

    d) Write advantages & disadvantages of hardware & software implementation   3

2. For each of the following systems (a and b), give one or more strategies for data storage. In each case explain your reasoning and give an estimate of how much memory in bytes, is required:

    (a) A pocket calculator having main source of power as sunlight and performs basic arithmetic (addition, subtraction, multiplication, division).   3

    (b) The main source of power to system clock for a personal computer power is direct current supplied by the personal computer when it is on and is to provide time and date information to the computer. Further, it must maintain the correct date and time for at least 5 years with the main power off.   3

    (c) Write the advantages of using DBMS over conventional file system.   3

3. (a) Prepare a DFD for computing the volume and surface area of a cylinder; Inputs are the height and radius of the cylinder. Discuss different ways of implementing the DFD.   4

    (b) Prepare a DFD for computing the mean of a sequence of input values. A separate control input is provided to reset the computation. Each time a new

value is input, the mean of all values input since the last reset command should be output. Since you have no way of knowing how many values will be processed between resets, the amount of data storage that you use should not depend on the number of input values. Detail your diagram down to the level of multiplications, divisions and additions. 5

4. (a) A simple digital watch has a display and two buttons namely button A and button B to set it.. The watch has two modes of operation, display time and set time. In the display time mode, hours and minutes are displayed, separated by a flashing colon. The set time mode has two sub modes, 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 sub modes, 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. Prepare a state diagram of watch. 3

(b) Explain in brief

(i) Object Model 2

(ii) Functional Model 2

(iii) Dynamic Model 2

5. (a) Prepare an object model to describe undirected graph, which consists of a set of vertices and set of edges. Edges connect pair of vertices, Your model should capture only the structure of graph (connectivity), and need not be concerned with geometrical details such as location of vertices etc. 4

(b) Prepare an object diagram for directed graph using a qualified association and two associations. A directed graph is similar to undirected graph, except the edges are oriented. 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. 5