

GANPAT UNIVERSITY
B. TECH. SEM. - V COMPUTER ENGINEERING / INFORMATION TECHNOLOGY
REGULAR EXAMINATION NOV / DEC - 2011
CE/IT-502: OBJECT ORIENTED ANALYSIS AND DESIGN

Time: 3 Hours]

[Total Marks: 70

Instructions:

1. Figures to the right indicate full marks.
2. Each section should be written in a separate answer book.
3. Be precise and to the point in your answer.

SECTION-I

- Q.1 (a)** Prepare a Class diagram for the given list of classes : (6)
 Sink, freezer, Refrigerator, Table, Light, Switch, Window, Smoke alarm, Burger alarm, Cabinet, Bread, Cheese, Ice, Door, Kitchen.
 Show association, aggregation, generalization, multiplicity, at least 10 attributes, 5 operations, association names, reflexive association, qualified association & association class where needed in your diagram.
- (b)** Construct a class diagram for the given scenario. Use association, attributes, methods & multiplicity where needed. A drive has multiple discs. A hard drive contains many discs and a floppy drive contains one disc. A disc is divided into tracks which are in turn subdivided into sectors. A file system may use multiple discs and a disc may be partitioned across file systems. Similarly a disc may contain many Files and a file may be partitioned across many discs. A file system consists of many files. Each file has an owner, permissions for reading and writing, date last modified, size, and checksum. Operations that apply to files include create, copy, delete, rename, compress, uncompress, and compare. Files may be data files or directory files. A directory hierarchically organizes groups of presumably related files. Directories may be recursively nested to an arbitrary depth. Each file within a directory can be uniquely identified by its file name. A file may correspond to many directory-file name pairs such as through UNIX links. A data file may be an ASCII file or binary file. (6)

OR

- Q.1 (a)** Categorize the following relationship into generalization, aggregation, Composition and association with proper justification. (6)
 (Show the diagram using notation)
- (1) Windows is composed of lot of frames.
 - (2) An account is either type savings or type current.
 - (3) A student takes a course from a professor.
 - (4) A drawing object is text, a geometric object, or a group.
 - (5) A dining philosopher uses a fork.
 - (6) A lawnmower consists of blade, engine, wheel, deck.
- (b)** Construct a class diagram for the given scenario. Use association, attributes, methods & multiplicity where needed. Here described the basic keyboard. It is a musical instrument which can be operated by a switch for power. A keyboard is consists of white and black keys. We can play any tune by pressing this keys. Analysing from left to right, we find that the left keys are used to play the low pitch sound, middle keys to play medium sound and right most keys are used to play the high pitch sound. We have a style switch in the keyboard. By (6)

operating it, we can play different tunes. To select these different tunes we have to press up and down buttons. But whenever the style tune is off, the basic tune is played. Also we can regulate the volume of keyboard from high to low or low to high level with the help of volume regulator present in it.

- Q.2 (a) Construct a use case diagram for given scenario. Show include, extend & generalization where needed. A student may register for classes during a specified registration period. To register, a Student must see their advisor. The advisor must approve each course that the student has selected. The advisor will use the registration system to determine if the student has met the course prerequisites, is in good academic standings and is eligible to register. If the advisor approves the courses, the advisor enters the student's college id into the course registration system. The course registration number for each course is entered. The course description, course number and section for those courses will automatically display. The system will check for schedule conflicts before saving the registrations. A bill for the courses will print in the office. The student should proceed to pick it up. Faculty can use the registration system to check enrollments in their classes, get a class list, check a student's transcript, and look up a student's phone number and other such student information. The registrar can use the registration system to enter new classes for an upcoming semester, cancel a class, and check conflicts in classroom/faculty assignments. Admissions use the registration system to add new students. (6)
- (b) Prepare a use case diagram for given scenario. Show include, extend & generalization where needed. In the Hotel Information System, there are two types of customers: tour-group customer and individual customer. Both can book, cancel, check-in & check-out of a room by phone or via the internet. There are booking process clerk and reception staff who manages it. Customer can pay his bill by credit card or pay utility bill. (5)

OR

- Q.2 (a) Construct a use case diagram for the given scenario. Show include, extend & generalization where needed. A water cooler is a device that cools and dispenses water. They are generally broken up in two categories: bottle-less and bottled water coolers. Bottle-less water cooler are hooked up to a water supply, while bottled water coolers require delivery (or self pick up) of water in large bottles from vendors. The most common form of the water cooler is wall mounted and connected to the building's water supply for a continuous supply of water and electricity to run a refrigeration unit to cool the incoming water, and to the building's waste disposal system to dispose of unused water. Some versions are freestanding floor models, which are becoming more popular in countries where it is not common to drink water straight from the tap. (6)
- (b) An auto rental company wants to develop an automated system that would handle Car reservations, customer billing, and car auctions. Usually a customer reserves a car, picks it up, and then returns it after a certain period of time. At the time of pick up, the customer has the option to buy or waive collision insurance on the car. When the car is returned, the customer receives a bill and pays the specified amount. In addition to renting out cars, every six months or so, the auto rental Company auctions the cars that have accumulated over 20,000 miles. Draw a use case diagram for capturing the requirements of the system to be developed. Include an abstract use case for capturing the common behavior among any two Use cases. Extend the diagram to capture corporate billing, where corporate Customers are not billed directly; rather the corporations they work for are billed and payments are make sometime later. (5)

- Q.3 (a) Draw the state diagram for three phase induction motors will spin either clockwise or counterclockwise, depending on the connection to the power lines. (6)
- In applications requiring motor operation in both directions, two separate contactors (power relay) might be used to make the connections, one for each direction. Also, in some applications of large motors, the motor starts through a transformer that reduces the impact on the power supply. The transformer is bypassed by a third contactor after the motor has been given enough time to come up to speed. These are three momentary control inputs: request for forward, reverse, or off. When the motor is off, forward or reverse requests cause the motor to start up and run in the requested direction. A reverse request is ignored if the motor is starting or running in the forward direction, and vice versa. An off request at any time shuts the motor off.
- (b) Draw a state diagram for simple digital watch has a display and two buttons to set it, the A button and the B Button. The watch has two modes of operation, display time and set time. In the display time mode, the watch displays hours and minutes, separated by a flashing colon. The set time mode has two sub modes, set hours and set minutes. The A button selects modes. Each time it is pressed, the mode advances in the sequence: display, set hour, set minutes, display, etc. Within the sub modes, the B button advances the hours or minutes once each time it is pressed. Buttons must be released before they can generate another event. (6)

SECTION-II

- Q.4 (a) Draw an activity diagram for given scenario. Movie Ticket Selling System (MTSS) is mainly used for searching movie and purchasing movie tickets. Each movie is described with a movie ID, movie title, descriptions, date, time, duration and venue. MTSS should consist of touch screen as interface between customer and system, credit card reader and ticket printer. Each customer should use screen for searching movie in order to read movie details or preview the trailer of the movie. After customer selected the movie, the screen will display the available seats. The customer selects the seat and the system will prompt the payment amount. The payment transaction should be settled by credit card. The payment will be confirmed if the card does not exceed its credit limit. If the payment cannot be confirmed, error message will be displayed on the screen and purchasing will be terminated. Once the payment has been confirmed, the ticket will be issued to the customer. (6)
- (b) Construct an activity diagram for the following process & use Swim lane to show the various interactions. A customer decides to upgrade her PC and purchase a DVD player. She begins by calling the sales department of the PC vendor & they tell her to talk to customer support and they put her on hold while talking to engineering. Finally, customer supports to tell the customer about several supported DVD options. The customer chooses a DVD & it is shipped by the mail department. The customer receives the DVD, installs it satisfactorily & then mails her payment to accounting. (6)

OR

- Q.4 (a) Prepare an activity diagram for given scenario. Safe Home system is a system already developed which is a fully computerized and provides security to a house in which it is installed. The home-owner is supposed to configure the system for security purpose. When it is installed, it monitors all sensors connected to the security system, and interacts with homeowner through a keypad and function keys contained in safe home control panel. During installation, the Safe home control panel is used to "program" and configure the system. Each sensor is assigned number and type, a master password is programmed for arming and disarming the system. Telephone numbers are input for dialing when a sensor event occurs. When a sensor event is recognized, the software invokes an audible alarm attached to the system. After a delay time that is specified by the homeowner during system configuration activities, the software dials a telephone number of a monitoring service, provides information about the location, reporting the nature of the event that has been detected. (6)
- (b) Prepare an activity diagram for given scenario of Washing machine. (6)
- Basic function:-Washing machines get clothing cleaned by plunging the clothes through the water and detergent mixture. It is the motion that really helps to loosen dirt.
- How it works: - In top loading machines the agitator twists back and forth pulling the clothes down to the bottom of the tub. The clothes then work their way back up to the top where the agitator grabs them again. In a front loading machine, the clothes tumble and are plunged into the water over and over again. After the water is pumped out, the inner drum uses centrifugal force to wring out more water from the clothes by spinning at several hundred RPMs.
- General principles of designing WM:-The controls consist of a timer, cycle selector mechanism, water temperature selector, load size selector and start button. The mechanism includes the motor, transmission, clutch, pump, agitator, inner tube, outer tube and water inlet valve. All washer machines work by using mechanical energy, thermal energy, and chemical action. Mechanical energy is

imparted to the clothes load by the rotation of the agitator in top loaders, or by the tumbling action of the drum in front loaders. Thermal energy is supplied by the temperature of the wash bath.

- Q.5 (a) Draw a sequence diagram for the Elevator Problem as per given scenario. A product is to be installed to control elevators in a building with m floors. The problem concerns the logic required to move elevators between floors according to the following constraints: Each elevator has a set of m buttons, one for each floor. These illuminate when pressed and cause the elevator to visit the corresponding floor. The illumination is canceled when the elevator visits the corresponding floor. Each floor, except the first floor and top floor has two buttons, one to request an up-elevator and one to request a down-elevator. These buttons illuminate when pressed. The illumination is canceled when an elevator visits the floor and then moves in the desired direction. When an elevator has no requests, it remains at its current floor with its doors closed. (6)
- (b) Prepare a Collaboration diagram for Phone calling & receiving process using Telephone which includes caller, callee & telephone system. (5)

OR

- Q.5 (a) Moving a bag of corn, a goose, and fox across a river in a boat. Only one thing may be carried in the boat at a time. If the goose is left with the corn, the corn will be eaten. If the goose is left alone with fox, the goose will be eaten. Prepare two sequence diagrams, one in which something gets eaten and one in which everything is safely transported across the river. (6)
- (b) Prepare Collaboration diagram for the given shopping mall problem: The system will allow more than one shop owner to set up different shops to sell various products under one roof i.e. mall. An environment that allows the following. Shop Owner who is the person wishing to setup shop in the mall. Person can send a proposal to the mall owner. The mall owner approves the proposal and confirms the deal. Then, Shop owners can setup and maintain their own shop in the Mall. When Customers enter in the mall have to authenticate themselves on a central server. After authentication, the customer is allocated a shopping cart and they can enter a particular shop of based on their choice for shopping. After entering a shop, customer can brows through the products available in the shop & can select some of them and put into the shopping cart. Customer can anytime change the items in the cart either by adding new items or by removing existing items. Customer proceeds towards the payment counter. List of items he finally wishes to buy and make the final payment. He/She then leaves the shop and can either enter another shop or leave the mall. The mall can allow customers to purchase products from all the shops in the Mall. (5)
- Q.6 (a) Prepare a Data flow diagram up to level 2 for Student Academic Record Management System: First of all a Set of Course is selected. Each course consists of a unique course number, number of credits and the syllabus. Students are admitted to courses. Each students detail includes roll number, address, semester number and the courses registered for the semester. The marks of the student for various units are keyed in; the SWA (semester weighted average) is calculated. The recent marks of a student are added to his previous marks and a weighted average based on the credit points for various units is calculated. The marks for the current semester are formatted and printed. The SWA appears on the report. A check must be made to determine if a student should be placed on the vice - chancellor's list. This is determined based on whether a student scores an SWA of 85 or higher. If the SWA is lower than 50, the student is placed on conditional standing. (6)

- (b) Draw a Data flow diagram up to level 2 for computing the net score for a trial in judged athletic competitions that describes the following method. Each attempt of a competitor in an event is observed by several judges. Each judge rates the attempt and holds up a score. A reader assigned to the group of judges announces the scores one at a time to a panel of scorekeepers. Three scorekeepers write the scores down, cross off the highest and the lowest scores, and total up the rest. They check each other's total to detect errors in recording and/or arithmetic. In some cases, they may ask the reader to repeat the scores. When they are satisfied, they hand their figures to three other scorekeepers who multiply the total score by a difficulty factor for the event and take the average to determine a net score. The net scores are compared to detect and correct scoring errors.

END OF PAPER