Code : 051604

B.Tech 6th Semester Exam., 2016

OBJECT-ORIENTED ANALYSIS AND DESIGN

Time : 3 hours

Full Marks : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

(ii) There are **NINE** questions in this paper.

(iii) Attempt **FIVE** questions in all.

(iv) Question No. **1** is compulsory.

1. Choose the correct alternative (any *seven*) :

2×7=14

(a) What does a simple name in UML class and objects consists of?

(i) Letters

(ii) Digits

(iii) Punctuation characters

(iv) All of the above

(b) What does a composite name consists of in a UML class and object diagram?

(i) Delimiter

(ii) Simple names

(iii) Digits

(iv) All of the above

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(Turn Over)

(c) A class consists of which of these abstractions?

(i) Set of the objects

(ii) Operations

(iii) Attributes

(iv) All of the above

(v) (ii) and (iii)

(d) A class is divided into which of these compartments?

(i) Name compartment

(ii) Attribute compartment

(iii) Operation compartment

(iv) All of the above

(e) An attribute is a data item held by which of the following?

(i) Class

(ii) Object

(iii) All of the above

(iv) None of the above

(f) What should be mentioned as attributes for conceptual modelling?

(i) Initial values

(ii) Names

(iii) All of the above

(iv) None of the above

(g) An operation can be described as

(i) object behaviour

(ii) class behaviour

(iii) functions

(iv) (ii) and (iii)

(v) None of the above

(h) Which of these are part of class operation specification format?

(i) Name

(ii) Parameter list

(iii) Return-type list

(iv) All of the above

(i) What among these is true?

(i) Associations may also correspond to relation between instances of three or more classes

(ii) Association lines may be unlabeled or they may show association name

(iii) All of the above

(iv) None of the above

(j) What is multiplicity for an association?

    (i) The multiplicity at the target class end of an association is the number of instances that can be associated with a single instance of source class

    (ii) The multiplicity at the target class of an association is the number of instances that can be associated with a number instance of source class

    (iii) All of the above

    (iv) None of the above

2. Where to use activity diagrams? Draw an activity diagram for order management system. The order management system consists of following activities :

    (a) Send order by the customer

    (b) Receipt of the order

    (c) Confirm order

    (d) Dispatch order

After receiving the order request condition checks are performed to check if it is normal or special order. After the type of order is identified dispatch activity is performed and that is marked as the termination of the process. 14

3. How to draw object diagram? Draw a class diagram for an *Order System* of an application. So it describes a particular aspect of the entire application.

    (a) First of all *Order* and *Customer* are identified as the two elements of the system and they have a *one to many* relationship because a customer can have multiple orders.

    (b) We would keep *Order* class is an abstract class and it has two concrete classes (inheritance relationship) *Special Order* and *Normal Order*.

    (c) The two inherited classes have all the properties as the *Order* class. In addition they have additional functions like *dispatch()* and *receive()*. 14

4. Explain the conceptual model of unified modelling language. Explain with necessary example the basic notation used in UML diagram. 14

5. (a) For complex software systems, it is useful to write a description of the *problem to be solved* separately from any description of the *proposed solution*. Give three reasons why a separate problem description is useful.

Why is it hard to write a problem description without also thinking about the proposed solution? 7

(b) In order to assess which risks are the most important, it is common to calculate risk exposure, which gives a simple numeric value for each risk, allowing them to the compared. How would you calculate risk exposure for common software development project risks? 7

6. Draw a UML class diagram representing the following elements from the problem domain for a hockey league. A hockey league is made up of at least four hockey teams. Each hockey team is composed of six to twelve players, and one player captains the team. A team has a name and a record. Players have a number and a position. Hockey teams play games against each other. Each game has a score and a location. Teams are sometimes lead by a coach. A coach has a level of accreditation and a number of years of experience, and can coach multiple teams. Coaches and players are people, and people have names and addresses. Draw a class diagram for this information and be sure to label all associations with appropriate multiplicities. 14

7. The following is a use case description of the examination paper preparation support system. Draw a UML activity diagram according to the description : 14

Use case name : submit question

Participant : lecturer

Entry condition :

1. The question is ready and stored in a file

2. The lecturer is assigned to the module

Exit conditions :

1. The file is uploaded to the system

2. The module leader is notified of the availability of the question

3. The event is logged by the system

Flow of events :

1. The lecturer logs into the system by entering his/her username and password;

2. The system checks the username and password;

3. The system displays the list of modules of which he/she is the lecturer, module leader and/or internal examiner;

4. The lecturer selects a module and his/her role in the module as a lecturer;

5. The system prompts the user to enter the file name and location on his/her computer, and additional information if any;

6. The lecturer enters file name and location, and types in the additional information;

7. The lecturer submits the questions and the file is uploaded to the system;

8. The system saves the file;

9. The system confirms the success of uploading the file.

10. The system notifies the module leader of the submission of the questions.

Exceptional conditions and alternative flow of events :

When the username and password is not correct :

    3.1 : display error message, go back to step 1;

When the lecturer is not listed on the module :

    4.1 : quit the system;

Special requirements :

1. The file should be encrypted when transmitted from lecturer's computer to the server

2. The notification of success in uploading the file should be within 20 seconds

3. The event should be recorded in a log file to contain the following information :

    (i) Name of the lecturer

    (ii) Date and time of the event

    (iii) The name of the event (upload exam question)

    (iv) The file on the server that stores the questions

8. The following are description of systems. Draw a UML class diagram to represent the structural model for each of them :   14

    (a) A university offers a number of degree programmes, which are classified into BSc (Hons) degree programme, MSc degree programme and PhD degree programme. To teach students in various programmes, the university runs a number of course modules.

A particular module could be acceptable to a program, or compulsory to a program, or not acceptable at all to the programme. Each BSc (Hons) degree programme contains a number of modules as acceptable or compulsory, which are classified into stage I modules, advanced modules and honours modules. For a student who studies a BSc (Hons) degree programme, in order to obtain the degree he/she must complete a study plan that consists of at least 8 stage I modules, 16 advanced/honours modules and 4 honours modules that are acceptable to the programme.

(b) A hotel has number of rooms that can be rent by guests. There are also number of bathrooms, which are either connected to a specific room or are used to service multiple rooms on the floor. The rooms are classified into three types—single rooms, double rooms and family rooms. Each single room can only be rent to at most one guest. Each double room can be rent to at most two guests. Each family room can be rent to a family of up to two adults and two children.

9. The following SCR mode table describes the required behaviour of a car's cruise control system. Draw a UML State Chart Diagram to show the same information. Use superstates (where appropriate) to simplify your diagram, and be sure to label all transitions with the relevant events and conditions :   14

Old mode	Ignition	Cruise switch	Running	Brake	Accelerator	Too fast?	New mode
Off	@T	—	—	—	—	—	Inactive
Inactive	@F	—	—	—	—	—	Off
	T	@T (cruise)	T	F	F	F	Cruise
Cruise	@F	—	—	—	—	—	Off
	—	—	—	—	—	@T	Inactive
	—	—	@F	—	—	—	Inactive
	—	—	—	@T	—	—	Override
	—	—	—	—	@T	—	Override
	—	@T (cancel)	—	—	—	—	Override
Override	@F	—	—	—	—	—	Off
	T	—	@F	—	—	—	Inactive
	T	@T (resume)	T	F	F	F	Cruise
	T	@T (cruise)	T	F	F	F	Cruise

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