



THE OPEN UNIVERSITY OF SRI LANKA
 B.Sc. DEGREE PROGRAMME
 CSU 3277: SOFTWARE ENGINEERING
 FINAL EXAMINATION – 2011/2012
 DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
 DURATION: 3 HOURS.

Date: 20th December, 2011

Time: 1.00 pm to 4.00 pm

Answer FOUR Questions ONLY.

- Q1. (i) Describe *software crisis* that encountered during the development of computer software.
- (ii) What are the six properties that software should consist of? Briefly describe four of them.
- (iii) (a) Briefly describe the four types of information systems.
 (b) How do they differ from each other?
- (iv) (a) What is *Computer-Aided Software Engineering (CASE)*?
 (b) Why are CASE tools used in organizations?
- Q2. (i) (a) What is the *system development methodology*? Why is it used?
 (b) State two different types of System Development Life Cycles (SDLC) and identify the phases of them. Briefly describe one of them.
- (ii) (a) What is the purpose of doing a feasibility study and why is it important in system development?
 (b) Describe the three aspects of testing the feasibility.
- (iii) Describe the purpose of the requirement analysis phase.
- (iv) (a) State the three stages of requirement analysis and specification phase. Describe two of them.
 (b) What are the problems that arise usually when gathering requirements?

- Q3. (i) (a) How does *process modeling* differ from *data modeling*?
- (b) Differentiate between *Data Flow Diagrams* and *Entity Relationship Diagrams*.
- (ii) (a) Define the *figure 0 diagram*, *context diagram* and *figure n diagram*.
- (b) What are the principle rules for drawing context diagrams for a given scenario?
- (iii) Explain the following terms by means of examples.
- (a) Data Flow
 - (b) External Entity
 - (c) Data Store
 - (d) Process

- (iv) Following paragraph describes a proposed system that supports the correspondence courses.

A college offers correspondence courses to students. Each course lasts 20 weeks and is based on a weekly study module and progress test. At the end of the course, students sit an invigilated examination. The college Registrar deals with enquiries and applications, and students who have sufficient qualifications are asked to register by completing and submitting an application form. After approval by the Academic Director, the application form is returned to the Registrar who creates a student file. The Accounts department receives the application form and using information from the student file it creates an invoice that is sent to the student. Payments made are registered on the invoice file. The first batch of student materials and tests are issued from the library only to students who have paid fees (this information is taken from the invoice file). Progress tests are marked by academic staff and the results, together with comments, are sent out with next week's study block. The library will only issue study material/progress tests when a student has returned test answers from the previous week.

Develop a Level 0 DFD and a context diagram for the above proposed system.

Q4. (i) Decision trees and Decision tables are techniques which are used in logical modeling.

- (a) What are the differences between *decision tables* and *decision trees*?
- (b) What are the three types of decision tables? Describe them by giving examples.

(ii) A description about a book sale is given below.

If order is from book store and if order is for 6 copies, then discount is 25%. Else (if order is for less than 6 copies) no discount is allowed. Else (if order is from libraries) and if order is for 50 copies or more, then discount is 15%. Else if order is for 20 to 49 copies, then discount is 10%. Else if order is for 6 to 19 copies, then discount is 5%. Else (order is for less than 6 copies) no discount is allowed.

Construct a decision table using the information given in the above scenario.

- (iii) (a)** What is a *decision tree*?
- (b)** There are different entrance rules for different days of the week. Those rules differ among themselves depending on whether it is a national holiday or a non-holiday. Specifically, if you visit on a Saturday which also happens to be a national holiday, do not bother to come because the site is closed. But on other Saturdays you can use the Main Head Quarter (HQ) entrance. If you are visiting on a Sunday, the site is again closed if it is a national holiday. But if not, you should use the Bartlett Avenue entrance for access. If you'd like to pay visit on a regular weekday, use the 345 Pear St. entrance if it is a national holiday. If not, use the Main HQs entrance.

Construct a decision tree using the above paragraph.

- (iv) (a)** Briefly describe the following terms.
 1. Entity
 2. Entity type
 3. Attribute
 4. Primary key
- (b)** Develop Entity Relationship Diagrams for the following statements,
 1. Customer has several Accounts
 2. Hotel is run by a Manager
 3. Book is written by an Author
 4. Patients see Doctors
 5. Players participate in Games

Indicate clearly the attributes, primary key(s) and connectivities. State clearly any assumption you make.

- Q5. (i) (a) What are the advantages and disadvantages of prototyping?
- (b) Describe the two prototyping techniques indicating their similarities and differences.
- (c) What are the benefits that the users get from prototyping?
- (ii) External Design and Internal Design are types of software design. Write the roles and characteristics of external design.
- (iii) (a) Why do software designers divide software systems into separate modules?
- (b) Explain the terms *coupling* and *cohesion*. Give the least desirable types of them.
- (iv) A structure chart shows how an information system is organized in a hierarchy of components called as modules.
- (a) Illustrate the following basic operations in structure charts using correct notations.
1. Sequence of operations
 2. If else
 3. Case
 4. Repetition
- (b) The following is the process for issuing of personal cheque books to customers in a bank.
- Customer fills the cheque book issue form at the counter. In the form he fills his account type, account No., name, No. of cheque leaves and signs it.
 - The clerk validates the account and checks the customer signature. If any of the information is not correct, then he returns the form.
 - If details are correct, he picks the required book from the stock, enters the numbers of cheque leaves against the customer account and issues the cheque book.

Draw a structure chart to explain the above scenario.

- Q6. (i) In a University, a file contains records of students on a three years degree programme and is sorted into the ascending order of the year. A program is required to count the number of 3rd year students who have paid their payments.
- (a) Describe the difference between *Physical* and *Logical data Structure Diagrams*.
 - (b) Draw Physical and Logical data Structure Diagrams for the above scenario.
- (ii) (a) Draw basic operations in Jackson Structured Design (JSD) using correct notations.
- (b) A student's subject average file contains records which are sorted into semesters within year. The records in the semesters are also sorted into grades. It is required to produce a report to show the subject's average details within appropriate highlighting for pass students and fail students. If the average is less than 30 then the student fail, otherwise she/he passes. Headings are required for each year, semester and grade. Total are needed at relevant points in the report at the change of year, semester and grade.
- 1. Construct the input and output logical structure diagrams.
 - 2. Construct the program structure diagram.
- (iii) (a) What is meant by *software coding*?
- (b) What are the features of a structured program?
- (c) What are the different types of testing techniques?
- (d) Briefly describe *Unit (module) testing* and *Acceptance testing*.
- (iv) Describe the following terms.
- (a) Direct installation.
 - (b) Documenting the system.
 - (c) Preventive maintenance.

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