CICT PART II SECTION 3

SYSTEMS ANALYSIS AND DESIGN

WEDNESDAY: 23 May 2018.   Time Allowed: 3 hours.

Answer ALL questions. Marks allocated to each question are shown at the end of the question.

QUESTION ONE

(a)   Describe two diagrammatic techniques that are used in a soft systems approach to information systems analysis.

(4 marks)

(b)   Assess four reasons why a systems analyst might consider an organisation's knowledge base when undertaking information systems analysis.

(4 marks)

(c)   After the government devolved services to the grassroot level, one county government decided to set up a second hand bookshop. The bookshop buys and sells second hand books which it loans to local people. The librarian has to keep a careful record of books loaned and returned.

Before anyone borrows any book, they must register with the bookshop and pay a deposit. The deposit is refunded when a person wishes to cease membership of the library provided all the borrowed books have been returned in good condition.

When someone offers a book for sale, the librarian searches the catalogue of books to check if there is a copy either in the library or for sale. If found, the librarian checks how much he paid for the copy or copies he already has. If he has several copies of the book already, he may decline to buy the book or offer a reduced price. If the copy of the book does not exist, the librarian will offer to buy it and will pay a reasonable price depending on its condition and rarity.

The librarian has realised that the supply of second hand books locally has diminished and the management has decided to set up a website where people can offer their books for the bookshop to purchase. The seller of a book would have to input the condition of a book as well as the title and publication date.

The web application would have to decide what price to offer by retrieving the purchase and selling price of any previous copies of the book. If the potential seller agrees to the price, a transaction number would be displayed for the seller to include when sending the book. The librarian will send a cheque to the seller when the book is received. If the application could not calculate a price, the librarian would send an email notification so that he can value the book himself.

Required:
Draw a Level 1 data flow diagram (DFD) to represent the above scenario.   (12 marks)

(Total: 20 marks)

QUESTION TWO

(a)   James Edward, the owner of ABC bookshop plans to introduce two types of loans: Long loans (for books to be taken out) and short loans (for books to be read on premises). The data to be stored for each long loan include loan code, borrowing number, loan date, return date and book condition on return while data stored for short loan includes loan code, borrower number, loan date, loan time, return time, and book condition upon return.

An object of class book consists of an introduction, number of chapters and index.

Required:
Explain the following relationships between classes using examples from the above case:

(i)   Association.   (2 marks)

(ii)   Aggregation/composition.   (2 marks)

(iii)   Generalisation/inheritance.   (2 marks)

(b) The owner of ABC Systems, a small computer repair company hopes to expand and employ more experts in future. At present, much of the information about repair jobs is held in a cabinet which is rather disorganised hence the need for a computerised filing system. When a new job arrives, the fault and the customer's details are recorded and repair time given. The owner checks the list of jobs on a daily basis and if the requisite parts are unavailable he places an order and re-schedules the job to a later date. The customer pays for the invoice upon collecting their order. The missing parts are checked and ordered weekly.

Required:
(i) Using the above scenario, distinguish between a logical data flow diagram and a physical data flow diagram.
(4 marks)

(ii) Produce a use-case diagram with respect to the role played by the owner of ABC systems. (10 marks)
(Total: 20 marks)

QUESTION THREE
(a) A patient may be prescribed many different drugs. Each drug may be prescribed to many different patients.

Required:
Using the unified modelling language (UML) notation for class diagrams, draw a class diagram described by the above scenario.
(4 marks)

(b) An electronic shop is offering interest-free credit on selected electronic equipment. If a customer wishes to take up this offer, one of the following criteria must be satisfied:
- The customer is credit worthy. If Not,
- The customer is a salaried employee. If Not,
- The customer is classified by the shop as a 'special person', owing to a long association with the shop.

If none of the criteria is satisfied then interest-free credit is not allowed. If any one criteria is satisfied, then the customer is given the interest free credit.

Required:
Illustrate the above scenario using a flowchart. (8 marks)

(c) Explain the importance of encapsulation in object oriented design. (2 marks)

(d) Describe three ways of measuring usability in a user interface. (3 marks)

(e) Highlight three types of technological changes that have enabled effective development of executive support systems.
(3 marks)
(Total: 20 marks)

QUESTION FOUR
(a) XYZ company management has decided to purchase "off-the-shelf" software to handle human resource aspect of its business.

As an information systems expert, summarise three guidelines that should be used to decide which "off-the-shelf" software would be suitable for the company.
(3 marks)

(b) Traditionally, information services are typically organised according to function or centres.

Assess the nature of "end-user computing" as an information service centre. (3 marks)

(c) One approach used to derive a program structure chart from a program Data Flow Diagram (DFD) in structured systems design is "transform analysis".

Required:

(i) Explain the meaning of transform analysis. (2 marks)

(ii) Relate "afferent", "efferent" and "central transform" to the technique in (c) (i) above. (3 marks)

(d) It is critical for any systems development effort to be anchored in a formal methodology.

Required:
(i) Citing its components, describe the term "methodology". (4 marks)

(ii) Defend the reasons why companies should employ system development methodologies. (3 marks)

(iii) Relate the principle of getting owners and users involved in systems development through a methodology.
(2 marks)
(Total: 20 marks)

QUESTION FIVE

(a)   Menu selection is a major activity in a user interface design.

        Examine two reasons why pull-down menus might be a bad choice for interface design.   (4 marks)

(b)   Assess four benefits of systems analysis and design standards.   (4 marks)

(c)   Explain three types of behavioural testing methods.   (6 marks)

(d)   Differentiate between "schematic model" and "flow system model".   (2 marks)

(e)   Prototyping may be used in requirements gathering phase of systems analysis.

        Examine how prototyping could be used in requirements gathering.   (4 marks)

(Total: 20 marks)

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