Do not award half marks.
In all cases give credit for appropriate alternative answers.

Question 1 (Compulsory) (30 marks)

(a) What is a *systems request*? What is its relevance to the SDLC? [2]

An end user or manager submits a systems request to define the work that must be done for a specific information system (1 mark). An end user or manager submitting a systems request triggers the start of the systems development life cycle (1 mark).

(b) Explain the *two* roles that prototypes may play in the system development life cycle. [2]

A prototype can serve as the definition of the end users' requirements (1 mark) or as the initial version of an information system (1 mark).

(c) (i) What is an *RFP*? [2]

(ii) How does an RFP differ from an RFQ? [2]

(i) A request for proposal (RFP) is a written list of the information system requirements (1 mark) that you give to prospective software vendors before you decide on a specific package (1 mark).

(ii) RFPs help the vendors determine whether they have a product that is a possible software solution, whereas a request for quotation (RFQ) solicits price and related information from vendors for the particular hardware and/or software products you specify in the proposal (1 mark). The RFP tends to be open-ended in terms of the possible solutions sought by the organization, while the RFQ usually identifies a specific solution (1 mark).

(d) (i) What does it mean for a system to be *feasibile*. [1]

(ii) State, with justification, whether it is possible for a project to be feasible initially, only to be rejected later in the development cycle? [2]

(i) A system is feasible if the request can be successfully implemented (1 mark).

(ii) Yes (1 mark), if there is a significant change in one or more of the factors affecting feasibility (1 mark).

(e) List *five* decisions that management might reach at the end of the systems analysis phase. [5]

One mark should be awarded for each decision named (up to a maximum of five marks). Examples include the following.

- **Develop an in-house system.**
- **Modify the current information system.**
- **Purchase and/or customize a software package.**
- **Perform additional work on the systems analysis phase.**
- **Terminate further work on the information system.**

(f) Describe the information requirements of the following organizational levels of a typical business.

(i) Operational personnel.
(ii) Lower management.
(iii) Middle management.
(iv) Upper management. [4]

(i) Operational personnel need very detailed information directly related to the job functions they perform (1 mark).
(ii) Members of lower management need detailed operational information, and some exception and summary information specific to their narrow areas of responsibility (1 mark).
(iii) Middle managers need less detailed information, more exception and summary information, and broader information than lower management (1 mark).
(iv) Top managers need summary-level information, one-time, what-if information, and external information to support the strategic planning process (1 mark).

(g) Define the term *project scope*. [1]

Determining the project scope means to define the boundaries, or extent, of the project (1 mark).

(h) Define the term *data dictionary*. [1]

A data dictionary defines and describes all data elements and meaningful combinations of data elements (1 mark).

(i) "Super Shoes" is a retailing company dealing in ladies' and men's shoes. Currently, "Super Shoes" places an order with the wholesaler every month, who will then deliver the items within a week. Each month the demand is projected to be higher than the previous month by 2% except during festive months. The manager calculates the projected sales for each month taking into consideration either a 2% growth in sales or a 4% to 8% growth depending on what time of the year it is. He then places the order with the wholesaler for the goods. If the goods have been on the shelf for more than two months they are considered 'unsold'. They are then offered for clearance sales at these special outlets. During festive months, however, festive sales are conducted at all outlets of the store. During the months when 'unsold' are recorded for any of the items, the orders for these items are adjusted by reducing the quantity ordered from the wholesaler.

Design a simple decision table to describe the above conditions and actions. [8]

One mark should be awarded for listing the conditions correctly.
One mark should be awarded for listing the actions correctly.
One mark should be awarded for enumerating the condition values correctly.
One mark should be awarded for each correct action row (up to 5 marks).

Normal Month	Y	Y	Y	Y	N	N	N	N
Festive Month	Y	Y	N	N	Y	Y	N	N
'Unsold'	Y	N	Y	N	Y	N	Y	N
Order at 2% projected sales	-	-	X	X	-	-	-	-
Order at 4-8% projected sales	-	-	-	-	X	X	-	-
Adjust order for 'unsold'	-	-	X	-	X	-	-	-
Offer clearance sales at special outlets	-	-	X	-	-	-	-	-
Offer festive sales at all outlets	-	-	-	-	X	X	-	-

Question 2

(a) (i) Define the term total cost of ownership (TCO). [1]

(ii) Why is TCO important? [2]

(i) In addition to direct costs, systems developers must identify and document indirect expenses that contribute to the total cost of ownership (TCO) (1 mark).

(ii) It is important where the development team is assessing several alternatives (1 mark). After considering the indirect (and sometimes hidden) costs, a system that seems inexpensive initially might turn out to be the most costly choice (1 mark).

(b) TCO is one issue that an analyst should consider before selecting an application architecture. Name *four* others. [4]

One mark should be awarded for each issue named (up to a maximum of four marks). Examples include the following.

- **Enterprise resource planning.**
- **Scalability.**
- **Web integration.**
- **Legacy interface requirements.**
- **Security.**
- **Processing options.**

(c) What is a client-server architecture? [1]

The term client-server architecture generally refers to systems that divide processing between one or more networked clients and a central server.

(d) Describe how the following characteristics differ between client/server systems and traditional mainframe systems.

(i) Basic architecture. [1]

(ii) Data storage options. [1]

(iii) Processing options. [1]

(i) Client-server systems have very flexible architectures, while mainframe systems have very rigid architectures (1 mark).

(ii) Client-server systems can be distributed to place data closer to users, while mainframe systems have all data stored centrally (1 mark).

(iii) In client-server systems processing options can be shared and configured in any desired form, while in mainframe systems processing options cannot be modified (1 mark).

(e) Describe each of the following patterns in which a LAN or WAN network can be configured.

(i) Hierarchical network. [1]

(ii) Bus network. [1]

(iii) Star network. [1]

(iv) Ring network. [1]

(i) In a hierarchical network, one computer controls the entire network (1 mark).

(ii) In a bus network, a single communication path connects the mainframe computer, server, workstations, and any peripheral devices (1 mark).

(iii) A star network has a central computer with one or more workstations connected to it that forms a star (1 mark).

(iv) A ring network resembles a circle of computers that can communicate with each other (1 mark).

Question 3

(a) Define the following terms, and give an example of each.

(i) Class. [2]

(ii) Instance. [2]

(iii) Subclass. [2]

(i) A class is a group of similar objects (1 mark). A further mark should be awarded for an appropriate example.

(ii) An instance is a specific member of a class (1 mark). A further mark should be awarded for an appropriate example.

(iii) A subclass is a more specific category of objects that exists within a class (1 mark). A further mark should be awarded for an appropriate example.

(b) Describe, and give examples of, each of the following.

(i) Class diagrams. [2]

(ii) Sequence diagrams. [2]

(iii) Activity diagrams. [2]

(i) A class diagram represents a detailed view of a single use case, shows the classes that participate in the use case, and documents the relationship among the classes (1 mark). A further mark should be awarded for any appropriate example.

(ii) A sequence diagram is a dynamic model of a use case, showing the interaction among classes during a specified time period (1 mark). A further mark should be awarded for any appropriate example.

(iii) An activity diagram resembles a horizontal flow chart that shows the actions and events as they occur (1 mark). A further mark should be awarded for any appropriate example.

(c) (i) What is the *weakest* type of relationship between objects and classes? [1]

(ii) When does the type of relationship of part (i) occur? [1]

(iii) Give an example of the relationship of part (i). [1]

(i) Dependency (1 mark).

(ii) A dependency occurs when one object must be informed about another (1 mark).

(iii) One mark should be awarded for any appropriate example.

Question 4

(a) (i) What is a *code*? [1]

(ii) List *two* purposes for which codes are used. [2]

(i) A code consists of letters and numbers that represent an item of data (1 mark).

(ii) One mark should be awarded for each purpose named (up to a maximum of two marks). Examples include the following.

- **Codes can provide savings in storage space, transmission time, and data entry time.**
- **They also can be used to reveal or conceal information.**

(b) After you begin working on the systems design phase, what situations might cause you to return to the systems analysis phase? Is this a common occurrence? If so, why; if not, why not? [4]

If you have overlooked an important fact you may need to return to fact-finding (1 mark)—or if unforeseen problems with the design are encountered, it may be necessary to return to requirements analysis (1 mark). Returning from systems design to systems analysis is not a common occurrence (1 mark), and might be a sign that previous work was inaccurate or incomplete (1 mark).

(c) Some systems analysts argue the following:

"You must give users what they ask for. If they want long reports with reams of data, then that is what you give them. Otherwise, users will be unhappy and feel that you are trying to tell them how to do their jobs."

Others argue the following:

"The systems analyst should dictate to users what information can be obtained from the system. If you listen to users, you'll never get anywhere, because they don't really know what they want and don't understand information systems."

(i) What do you think of the first of these arguments? [3]

(ii) What do you think of the second of these arguments? [3]

(iii) Which (if any) of these arguments do you support? [2]

(i) **The first argument has some truth. Information systems are designed for the users. When a user really needs information in the form of a long printed report, then that information must be provided. The implication in the last sentence that all users will resist every suggestion made by a systems analyst is unfair. Users are more computer-literate than ever, and most users are willing to consider alternative ideas. After all, users and IS professionals have a common goal — to serve the organization.**

Three marks should be awarded for an answer showing excellent understanding; two marks should be awarded for an answer showing good understanding; one mark should be awarded for an answer showing some understanding; no marks should be awarded otherwise.

(ii) **The second argument is even weaker. First of all, a systems analyst should "suggest" rather than "dictate." Secondly, users today are much more sophisticated about computer technology and thus more able to understand and accept information systems considerations. It is true, however, that users do not always know what information they really need or want, and the analyst should help users define their requirements.**

Three marks should be awarded for an answer showing excellent understanding; two marks should be awarded for an answer showing good understanding; one mark should be awarded for an answer showing some understanding; no marks should be awarded otherwise.

(iii) **Neither of these arguments, which present two extreme viewpoints, is totally justifiable (1 mark). The best policy probably is somewhere between these two views (1 mark).**

Question 5

(a) (i) What is a *DBMS*? [1]

(ii) Interfaces for users, database administrators, and related systems count as one component of a DBMS. List *three* others. [3]

(i) A DBMS provides an interface between a database and users who need to access the data (1 mark).

(ii) A data manipulation language (1 mark), schema (1 mark), and a physical data repository (1 mark).

(b) (i) What is a *DBMS schema*? [1]

(ii) What is a *subschema*? [1]

(i) A DBMS schema is a complete definition of a database that describes all fields, records, and relationships (1 mark).

(ii) A subschema is a definition of part of a database used and accessed only by certain programs or users (1 mark).

(c) Explain the difference between a *logical record* and a *physical record*. [2]

A logical record contains fields related to a single person, place, thing, or event (1 mark), whereas a physical record, also known as a block, consists of one or more logical records, and is the smallest unit of data accessed by the operating system (1 mark).

(d) (i) When is a record design in *first normal form*? [1]

(ii) How do you convert an unnormalized record design to 1NF? [1]

(i) A record is said to be in first normal form if it contains no repeating groups (1 mark).

(ii) To convert an unnormalized record you would expand the primary key of the record to include the key of the repeating group (1 mark).

(e) Consider an automobile dealership that maintains an inventory system of cars and trucks in stock at its three locations. Record fields exist for stock number, vehicle identification number, make, model, year, color, and invoice cost. Identify the possible candidate keys, the likely primary key, a probable foreign key, and potential secondary keys. Justify your choices. [5]

To identify the candidate keys, you must determine which fields in the record are unique to a single vehicle (1 mark). Only the stock number and vehicle identification number meet this requirement and could serve as primary keys (1 mark).

Because the stock number probably is smaller and locally generated by the automobile dealership, it would be the best choice for the primary key (1 mark).

It is possible that the model field is in the form of a code, such as Z99 or 4DX, which might serve as a foreign key for a record in the MODEL table (1 mark).

The dealership might want to access, display, or print information by make, model, year, color, or invoice cost — so these fields are potential secondary keys (1 mark).

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