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

Question 1 (Compulsory)

(a)   List the *four* types of relationship that may exist between objects.   [4]

Dependency (1 mark); association (1 mark); aggregation (1 mark); and inheritance (1 mark).

(b)   What are management information systems, and what are they used for?   [2]

A *management information system* is an organized set of processes that provides information to managers/management (1 mark). They support the operations and decision-making within an organization (1 mark).

(c)   There are a number of people in an organization who might use computer-based information systems. For each of the following, list the type of information system that supports the application:

(i)   The assistance for making organizational decisions.   [1]

Business support system.

(ii)   The codification and manipulation of knowledge.   [1]

Knowledge management system or Expert system.

(iii)   The automation of transaction data.   [1]

Transaction Processing System

(d)   Reduce the following decision table to a minimum number of rules.

	1	2	3	4	5	6	7	8
Diploma In IT	Y	Y	Y	Y	N	N	N	N
Hardware Experience	Y	Y	N	N	Y	Y	N	N
Software Experience	Y	N	Y	N	Y	N	Y	N
Job A	-	X	X	X	-	X	X	X
Job B	-	-	X	-	-	-	X	-
Job C	X	X	-	-	X	-	-	-
Job C	X	X	-	-	X	-	-	-

[5]

	1	**2**	**3**	**4**
Diploma In IT	-	Y	-	-
Hardware Experience	Y	Y	N	-
Software Experience	Y	N	Y	N
Job A	-	X	X	X
Job B	-	-	X	-
Job C	X	X	-	-
Job D	X	X	-	-

One should be awarded for reducing the table to four columns. One mark should be awarded for each correct column.

(e)   Describe, using examples, each of the following types of code.

    (i)   Significant-digit subset codes.   [2]

    (ii)   Cipher codes.   [2]

    (iii)   Sequence codes.   [2]

(i)   The code is divided into subsets of the code (1 mark). A further mark should be awarded for an appropriate example, e.g.,

Item number

1	2	3	4	5	6	7	8	9

Product Class   Vendor number

(ii)   The code is used to cover up information that should not be seen by unauthorized individuals (1 mark). A further mark should be awarded for an appropriate example, e.g.,

B	L	E	A	C	H	M	I	N	D
1	2	3	4	5	6	7	8	9	0

For markdown price. Markdown price would be displayed as BIMC on the price tag to prevent customer from knowing it. The staff would only know it only. BIMC means $18.75 for markdown price.

(iii)   It uses numeric or letter in serial to show the order in which events occurred (1 mark). A further mark should be awarded for an appropriate example, e.g.,

Student index number
0001
0002

(f)   The TELCOME Company is located in a three-storey building. The company requires that eight computers on the third floor and eight computers on the second floor, be connected to an Internet server on the first floor. Users on the second and third floors need to communicate with each other and also need access to the Internet. Two topologies have been proposed: bus and ring. For each topology, give *two* reasons why it should be employed.   [4]

One mark should be awarded for each appropriate reason supporting the bus network (up to a maximum of two marks). Examples include the following.
- **A single communication path connects the mainframe computer, server, workstations and peripheral devices.**
- **Information transmitted in either direction from any workstation to another.**
- **Any message can be directed to a specific device.**

One mark should be awarded for each appropriate reason supporting the ring network (up to a maximum of two marks). Examples include the following.
- **Resembles a circle of computers that communicate with each other.**
- **Is used when processing is performed at local sites.**

(g)   What is a data dictionary?   [1]

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

(h)   List *two* decisions that management might reach at the end of the systems analysis phase.   [2]

One mark should be awarded for each decision named (up to a maximum of two 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.**

(i)   Describe the process of converting an un-normalised record design into third normal form.   [3]

First, a record is converted into 1NF; a record is in this form if it does not contain a repeating group (1 mark). A record is then converted into 2NF; a record is in this form if it is in 1NF and if all fields that are not part of the primary key are dependent on the entire primary key (1 mark). Finally, a record is converted into 3NF; a record is in this form if redundancy and data integrity problems are avoided (1 mark).

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

Question 2

(a)   Explain the following user-centered design principles.

     (i)   Understand the underlying business functions.

     (ii)   Maximise graphical effectiveness.

     (iii)   Profile the system's users.

     (iv)   Think like a user.

     (v)   Design a comprehensive interface.   [5]

     (i)   The interface designer must understand the underlying business functions and how the system supports individual, departmental, and enterprise goals. The overall objective is to design an interface that helps users to perform their jobs.

     (ii)   Studies show that people learn better visually. For example, the popularity of Microsoft Windows is largely the result of a graphical user interface that is easy to learn and use.

     (iii)   A systems analyst should understand user experience, knowledge, and skill levels; if a wide range of capability exists, the interface should be flexible enough to accommodate novices as well as experienced users (1 mark).

     (iv)   To develop an interface driven by user requirements, the designer must learn to think like a user and see the system through a user's eyes.

     (v)   The user interface should include all tasks, commands, and communications between users and the information system; in a GUI environment, a user can display and work with multiple windows on a single screen.

(b) A new on-line resort reservation system for maintaining customer check-in and check-out details will perform the following major functions:

- Add reservation.
- Cancel reservation.
- Enquire about room availability.
- Check-in customer.
- Check-out customer.

Among the features of the customer information portion of the system will be the capability to enter information for the new customers, edit details of existing customer records, and print customer information.

The system is menu-driven and will enable the user to return from any point in the system to the previous menu or exit the system.

Develop the following screens for the application described as they pertain to the customer portion of the system.

(i)   Resort Reservation Main Menu Screen
(ii) Customer Screen

Design the screens to include all relevant information, as it should be shown to the user.   [10]

An example solution is given below.

Date : DD/MM/YY

Resort Reservation System

1	**ADD Reservation**
2	**CANCEL Reservation**
3	**Inquire Room Availability**
4	**Check In Customer**
5	**Check Out Customer**
6	**Quit FROM SYSTEM**

Please Enter The Desired Number_____

Date : DD/MM/YY

<u>**CUSTOMER SCREEN**</u>

Name: _____

Company: _____

Street: _____

City: _____ **State:** _____ **Zip:** _____

Telephone: (_____) _____ - _____

Arrive Date: __/__/____ **Departure:** __/__/____

Rate: _____ **Room Number:** _____

Total Amount: ____. __ **Payment Type:** __ (M,V,D,A)

Deposit: ____. __ **CC Number:** _____

F1 - Room Inquiry, F3 – Save/Exit, F4 – Cancel

Candidates are required to design a multiple screen layout for the application described as they pertain to the customer portion of the system with the information given in the question.

- **One mark should be awarded for providing two screen layouts.**

- **One mark should be awarded for illustrating the options on the menu screen.**

- **One mark should be awarded for illustrating the opportunity for input on the menu screen.**

- **Two marks should be awarded for applying good layout techniques to the menu screen design.**

- **Up to two marks should be awarded for illustrating the relevant information on the customer screen.**

- **One mark should be awarded for illustrating the opportunity for input on the customer screen.**

- **Two marks should be awarded for applying good layout techniques to the customer screen design.**

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

Question 3

(a)   Describe the following types of cost, and give an example of each.

(i)   Direct costs.

(ii)   Fixed costs.

(iii)   Developmental costs.   [6]

(i)   Direct costs are costs that can be associated with the development of a specific system (1 mark). A further mark should be awarded for an appropriate example.

(ii)   Fixed costs are costs that are relatively constant and do not depend on a level of activity or effort (1 mark). A further mark should be awarded for an appropriate example.

(iii)   Developmental costs are incurred only once at the time the system is developed or acquired (1 mark). A further mark should be awarded for an appropriate example.

(b)   For each of the following type of cost, identify whether it is tangible or intangible.

(i)   Costs of leasing or renting equipment and/or special facilities.   [1]

(ii)   Increased employee fatigue due to use of a new system.   [1]

(i)   Tangible (1 mark).
(ii)   Intangible (1 mark).

(c)   In the context of network diagrams, what do the following terms mean?

   (i)   Earliest start time.   [1]

   (ii)   Latest completion time.   [1]

   (iii)   Critical path.   [1]

   (i)   The EST for an event is the minimum amount of time necessary to complete all the activities that precede the event (1 mark).

   (ii)   The LCT for an event is the latest time at which the event can finish without delaying the project (1 mark).

   (iii)   A critical path is a series of events and activities with no slack time (1 mark).

(d)   List *two* ways in which PERT/CPM charts differ from Gantt charts.   [2]

   First, a PERT/CPM chart for even a small project can be rather complicated, and the degree of complexity increases significantly for larger projects (1 mark). Second, the picture presented by a PERT/CPM chart is not as clear as a Gantt chart, which graphically displays the timing and duration of the activities (1 mark).

(e)   Would you use PERT/CPM charts or Gantt charts to consider the allocation of resources?   [2]

   Neither (1 mark). Other techniques, such as Microsoft project should be used for this (1 mark).

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

Question 4

(a)   What is a *system requirement*? What purpose do they serve?   [2]

A system requirement is a characteristic or feature that must be included in an information system to satisfy business requirements and be acceptable to users (1 mark). System requirements therefore serve as benchmarks to measure the overall acceptability of the finished system (1 mark).

(b)   Outputs and inputs are the three general categories into which system requirements fall. What are the other *three*?   [3]

Processes (1 mark), performance (1 mark), and controls (1 mark).

(c)   For each of the following, identify which fact-finding techniques should be used:

(i)   To examine recorded operating procedures.   [1]

Documents review.

(ii)   To collect quantitative information.   [1]

Questionnaire.

(iii)   To collect qualitative information.   [1]

Interview.

(iv)   To solidify hazy understanding regarding the system.   [1]

Observation.

(v)   To review journals and articles related to the system.   [1]

Research.

(d)   Give *three* reasons why it is important to plan interviews.   [3]

One mark should be awarded for each reason given (up to a maximum of three marks). Examples include the following.

- **It ensures the effective utilization of interview time.**
- **The time allocated to interviews is usually less than hour.**
- **It helps to ensure that information not found in the submitted documents can be solicited.**

(e)   Give one example of an *open-ended question*, and one example of a *close-ended question*.   [2]

An example of an open-ended question is "How do you feel about working for this company?" [1], and an example of a close-ended question is "How many reports do you generate?" [1].

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

Question 5

(a)   What is the main difference between *structured analysis* and *object-oriented analysis*?   [2]

Structured analysis regards processes and data as separate components [1]. Object-oriented analysis combines data and the processes that act on the data into entities called objects [1].

(b)   Define the terms *class* and *instance*.   [2]

A class is a group of similar objects (1 mark); an instance is a particular member of a class (1 mark).

(c)   Define the term *polymorphism*. Give an example of polymorphism.   [2]

The same message to two different objects can produce different results; polymorphism is the term used to describe this concept (1 mark). A further mark should be awarded for an appropriate example.

(d)   Define the term *encapsulation*. Give an example of encapsulation.   [2]

Encapsulation describes the concept of all data and methods being self-contained (1 mark). A further mark should be awarded for an appropriate example.

(e)   Describe, using appropriate symbols, the technique of *use case modelling*. In particular, you should stat how use cases relate to use case diagrams.   [4]

A use case represents the steps in a specific business function of process (1 mark). An external entity, called an actor, initiates a use case by requesting the system to perform a function or process (1 mark). A further mark should be awarded for the use of the correct graphical symbols. A use case diagram is a visual summary of several related use cases within a system or sub-system.

(f)   What is a *class diagram*? How do class diagrams relate to DFDs?   [3]

A class diagram is a detailed view of a single use case, showing the classes that participate in the use cases (1 mark). In structured analysis, entities, data stores, and processes are transformed into data structures and program code (1 mark); similarly, class diagrams evolve into code modules, data objects, and other system components (1 mark).

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