



UCSC

University of Colombo, Sri Lanka

University of Colombo School of Computing



**DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY
(EXTERNAL)**

Academic Year 2022 — 1st Year Examination — Semester 2

IT2405 (R) — Systems Analysis and Design (Repeat)

Multiple Choice Question Paper
(2 Hours)

Important Instructions

- The duration of the paper is **2 Hours**.
- The medium of instructions and questions is English.
- This paper has **40 questions** on **10 pages**. Answer **all** questions.
- All questions are of the **MCQ** (Multiple Choice Questions) type.
- Each question will have **5 (five)** choices with **one or more** correct answers.
- This paper consists of 100 marks and all the questions will carry equal marks.
- There will be a penalty for incorrect responses to discourage guessing.
- The mark given for a question will vary from -1 (All the incorrect choices are marked & no correct choices are marked) to +1 (All the correct choices are marked & no incorrect choices are marked). However, **the minimum mark per question would be zero**.
- Answers should be marked on the **special answer sheet** provided.
- Note that questions appear on both sides of the paper. If a page is not printed, please inform the supervisor/invigilator immediately.
- Mark the correct choices on the question paper first and then transfer them to the given answer sheet which will be machine marked. **Please completely read and follow the instructions given on the other side of the answer sheet before you shade your correct choices.**
- Calculators are **not** allowed.
- *All Rights Reserved*. This question paper can NOT be used without proper permission from the University of Colombo School of Computing.

- 1) A/An is a computer-based system that emulates the decision-making abilities and knowledge of a human expert in a specific domain.

- (a) Transaction processing system.
- (b) Executive information system
- (c) Expert system.
- (d) Communication and Collaboration System.
- (e) Office Automation System.

- 2) Based on the requirements, a creates a high-level system architecture that outlines the structure, components, and relationships within the system and identifies the key modules or subsystems and defines their interfaces and interactions.

Which of the following is most suitable to fill the above blank space?

- (a) system user
- (b) system owner
- (c) systems analyst
- (d) project manager
- (e) system designer

- 3) Which of the following is/are correct regarding the stakeholders of an information system?

- (a) Systems Analyst bridge the gap between business requirements and technical implementation, serving as a technical person between stakeholders, users, and the development team.
- (b) A system programmer is a professional who specializes in developing, and maintaining computer software systems, specifically at a lower level, closer to the hardware and operating system.
- (c) System programmers are specialists who convert business requirements and statements of problems and procedures into computer languages.
- (d) A web developer is a professional who specializes in designing, creating, and maintaining websites and web applications and are skilled in various programming languages, frameworks, and technologies used for web development.
- (e) A business analyst is a professional who works closely with stakeholders to analyze business processes, identify needs, and recommend solutions to improve operations, systems, or products within an organization.

- 4) Consider the following skills.

- (i) Analytical and problem-solving skills
- (ii) General knowledge of business processing
- (iii) Communication and interpersonal skills

Which of the above skills is/are needed by systems analysts?

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|------------------------|-------------------------|-----------------------|
| (a) Only (i) | (b) Only (ii) and (iii) | (c) Only (i) and (ii) |
| (d) Only (i) and (iii) | (e) (i), (ii) and (iii) | |

5) Which of the following is/are popular software process models?

- (a) The Waterfall model
- (b) Incremental model
- (c) Iterative model
- (d) Agile model
- (e) Software Development life Cycle

6) The model is a linear, sequential approach to software development where each phase of the development process must be completed before the next phase can begin.
Which of the following is most suitable to fill the above blank space?

- (a) Iterative
- (b) Waterfall
- (c) Agile
- (d) Spiral
- (e) Incremental

7) When gathering requirements, which of the following tasks are typically performed to ensure a thorough understanding of the stakeholders' needs and expectations?.

- (i) Funding process of the project
- (ii) Identifying Stakeholders
- (iii) Conducting Interviews

- | | |
|-------------------------|-------------------------|
| (a) Only (i) | (c) Only (ii) and (iii) |
| (b) Only (ii) | (d) Only (iii) |
| (e) (i), (ii) and (iii) | |

8) When requirements are not identified correctly, what could happen from among the following?

- (i) Increased rework and delays.
- (ii) The system may be prone to errors.
- (iii) It can result in costly modifications and changes during the development process.

- (a) Only (i)
- (b) Only (ii)
- (c) Only (i) and (ii)
- (d) Only (ii) and (iii)
- (e) (i), (ii) and (iii)

9) Consider the following requirements

- (i) The system should handle a minimum of 100 concurrent user sessions.
- (ii) The system must be able to run on a variety of hardware and software platforms.
- (iii) The system should allow users to register and create an account.

Which of the above are non-functional requirements?

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|------------------------|-----------------------|------------------------|-------------------------|
| (a) Only (i) | (b) Only (i) and (ii) | (c) Only (i) and (iii) | (d) Only (ii) and (iii) |
| (e) (i),(ii) and (iii) | | | |

- 10) Consider the following requirements
- (i) The system should calculate the total order amount, including taxes and shipping costs.
 - (ii) The system should be able to handle a 20% increase in user traffic without performance degradation.
 - (iii) The system should validate the input data for accuracy and completeness.

Which of the above is/are functional requirements?

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|------------------------|------------------------|----------------|
| (a) Only (i) | (b) Only (i) and (ii) | (c) Only (iii) |
| (d) Only (i) and (iii) | (e) (i),(ii) and (iii) | |

- 11) Which of the following statements is/are correct regarding Requirements Analysis Phase?

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| <ul style="list-style-type: none"> (a) Identify and gather requirements from stakeholders through various techniques such as interviews, workshops, surveys, and observations. (b) Document the gathered requirements in a structured manner which involves capturing functional and non-functional requirements, use cases, user stories, and any other relevant information. (c) Design and implement all the Databases. (d) Identify and evaluate alternative solutions. (e) Validate the requirements to ensure their accuracy, completeness, and consistency which involves reviewing the requirements with stakeholders, seeking their feedback and clarification, and making necessary adjustments. |
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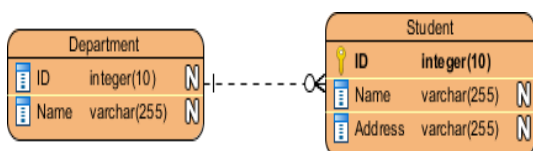
- 12) Some questions related to Data Modeling with possible answers are given below.

- (i) Q. Is the following statement correct?
“ In a Library System *Book*, *Member* and *LendingDetails* are entities”
A. Yes
- (ii) Q. What is a Data Model?
A. A data model is a conceptual representation of how data is organized, structured, and related within a system or database and it defines the structure, integrity constraints, and relationships of the data.
- (iii) Q. What is a *Relationship* in Data Modeling?
A. It is a natural business association that exists between one or more entities.

Which of the above answers is/are correct?

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|-------------------------|-----------------------|------------------------|
| (a) Only (ii) | (b) Only (i) and (ii) | (c) Only (i) and (iii) |
| (d) Only (ii) and (iii) | (e) All | |

- 13) Consider the following diagram and corresponding statements.



- (i) The degree of the above relationship is 2
- (ii) It is an example of a relationship with cardinality 1 to many
- (iii) A department has 0 or more students.

Which of the above statements is/are true?

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|------------------------|-------------------------|-----------------------|
| (a) Only (i) | (b) Only (iii) | (c) Only (i) and (ii) |
| (d) Only (i) and (iii) | (e) (i), (ii) and (iii) | |

- 14) Consider the following statements related to Process modelling.
- (i) Process modelling is used to understand and improve processes, and to communicate process information to others.
 - (ii) Logical models are always implementation-independent.
 - (iii) Physical processes consider the hardware, software, infrastructure, and other resources required to carry out the tasks defined in the logical processes.

Which of the above statements is/are correct?

(a) Only (i)	(b) Only (ii)	(c) Only (iii)
(d) Only (ii) and (iii)	(e) (i), (ii) and (iii)	

- 15) In a Data Flow Diagram (DFD), a/an represents a source or destination of data that interacts with the system being modeled.

- (a) Primitive process
- (b) External entities
- (c) Datastore
- (d) Data flow
- (e) Process

- 16) Some questions related to data flow diagrams (DFDs) with possible answers are given below.

- (i) Q. What is an *Elementary Process*?
A. It represents the lowest level of detail in modeling a system or process and it refers to a specific activity or task that takes input data, performs some processing, and produces output data.
- (ii) Q. What is a Datastore?
A. It represents a storage location where data is persisted and retrieved within the system being modeled and it is used to represent the storage and retrieval of data within the system's processes. A data store can be a physical database, a file, a spreadsheet, or any other data storage mechanism.
- (iii) Q. Is the following statement correct?
"A data store can be accessed and updated by multiple processes within the system and it serves as a means for processes to share and exchange data."
A. Yes.

Which of the above answers is/are correct?

(a) Only (i)	(b) Only (ii) and (iii)	(c) Only (i) and (ii)
(d) Only (iii)	(e) (i), (ii) and (iii)	

- 17) Which of the following is/are correct regarding Process modelling?

- (a) A Context Data Flow Diagram (DFD) is the highest-level representation of a system or process that shows the system's boundaries and interactions with external entities.
- (b) The Context DFD does not define the boundary of the system being modeled
- (c) Context DFD provides an overview of the system and its external environment, highlighting the data flows between the system and its external entities..
- (d) A data flow represents the movement of data between different components of a system and it represents the transfer of information from a source to a destination within the system, such as from an external entity to a process, between processes, or from a process to a data store.
- (e) Context DFD encapsulates the entire system and represents it as a single process or bubble.

18) Some questions related to entity modeling with possible answers are given below.

- (i) Q. What is a *degree* in entity modelling?
A. It indicates how many entities participate in a particular relationship.
- (ii) Q. What is a *cardinality* in an Entity relationship diagram?
A. It defines the number of instances or occurrences of one entity that are associated with the number of instances of another entity in the relationship.
- (iii) Q. Is the following statement correct?
"Relationships may also exist between different instances of the same entity."
A. No
- Which of the above answers is/are correct?

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| (a) Only (i) | (b) Only (i) and (ii) | (c) Only (iii) |
| (d) Only (ii) and (iii) | (e) (i), (ii) and (iii) | |

The blanks in the Questions 19-24 have to be filled by selecting the most appropriate words/phrases from the list labelled (i) – (vii).

- (i) Entity
- (ii) Subtype
- (iii) Cardinality
- (iv) Generalization
- (v) Inheritance
- (vi) Primary Key
- (vii) Supertype

What is the most appropriate word/phrase to fill in the given blanks?

19) in an ERD refers to the maximum number of instances of one entity that can be related to an instance of another entity.

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| (a) (i) | (b) (ii) | (c) (iii) |
| (d) (iv) | (e) (vi) | |

20) In a relational database is an identifier that uniquely identifies each record or row in a Table.

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| (a) (i) | (b) (ii) | (c) (iii) |
| (d) (vi) | (e) (vii) | |

21) We can have severals. that inherit from the "Vehicle" class, representing specific types of vehicles. One such type could be "Car," which inherits the properties and behaviors from the "Vehicle" superclass but also adds its own unique attributes and methods.

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| (a) (ii) | (b) (iv) | (c) (v) |
| (d) (vi) | (e) (vii) | |

22) enables code reuse, as common functionality is defined in the superclass and inherited by subclasses.

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| (a) (ii) | (b) (iii) | (c) (iv) |
| (d) (v) | (e) (vi) | |

- 23) When designing a Data Model for *Payment* you can have a entity called *Payment* and its child entities can be *CashPayments* and *CreditPayments* that has specialised features.

(a) (i)	(b) (ii)	(c) (iii)
(d) (iv)	(e) (vii)	

- 24)is used to abstract common attributes, behaviors, and relationships among classes into a more generalized and abstract form.

(a) (i)	(b) (ii)	(c) (iii)
(d) (iv)	(e) (vii)	

- 25) Consider the following statements.

- (i) DFDs can be decomposed into multiple levels to provide a more detailed representation of the system where the top-level diagram represents the system at a high level, and subsequent levels break down processes into smaller subprocesses.
- (ii) Data flows represent the movement of data between processes, data stores, and external entities and they show how data is input to a process, processed within the system, and output to other components.
- (iii) Processes in a DFD might execute in parallel.

Which of the above statements is/are correct?

(a) Only (i)	(b) Only (ii)	(c) Only (iii)
(d) Only (i) and (ii)	(e) All	

- 26) Which of the following is correct regarding ER (Entity-Relationship) modelling?

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| <ul style="list-style-type: none">(a) ER modeling is a technique used in database design to visually represent the structure and relationships of entities within a system.(b) It provides a high-level view of the data requirements and relationships, serving as a blueprint for designing a database schema.(c) Entities are the real-world objects or concepts that we want to store data about in the database. They can be tangible objects (such as a customer or a product) or intangible concepts (such as an order or a transaction).(d) ER modeling helps in analyzing and capturing the data requirements of a system, identifying entities and their relationships, and designing an efficient database schema.(e) ER diagram is a behavioral diagram used in software engineering and system design to depict the behavior of an object or system in response to external events or conditions |
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- 27) The benefits that a system provides can be categorized into Tangible and Intangible benefits. Which of the following is/are tangible benefits?

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| <ul style="list-style-type: none">(a) Implementing an automated system can lead to reduced operational costs, such as lower labor expenses, decreased material wastage, or savings on inventory management.(b) Streamlining processes and eliminating manual tasks can improve productivity, reduce cycle times, and enhance operational efficiency.(c) Implementing marketing strategies or launching new products/services can lead to increased sales and revenue generation.(d) Providing excellent customer service, enhance customer satisfaction(e) Offering a positive work environment ,increase employee morale and engagement. |
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The blanks in the Questions 28 – 34 have to be filled by selecting the most appropriate words/phrases from the list labelled (i) – (vi). Note that one word/phrase may be used in more than one instance.

- (i) Use Case Diagram
- (ii) Unified Modelling Language
- (iii) Encapsulation
- (iv) Class Diagram
- (v) Inheritance
- (vi) Polymorphism

What is the most appropriate word/phrase to fill in the blanks?

- 28) promotes code reuse as common attributes and behaviors can be defined in the superclass and inherited by multiple subclasses. This helps in reducing code duplication and promoting modular and maintainable code.

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| (a) (i) | (b) (ii) | (c) (iii) |
| (d) (iv) | (e) (v) | |

- 29) In Object Oriented Programmingallows methods to be defined in a superclass and then overridden in subclasses, providing different implementations based on the specific subclass.

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| (a) (i) | (b) (iv) | (c) (v) |
| (d) (vi) | (e) (vii) | |

- 30) In OOAD, is used to model the real world. For example, a car object might have properties such as make, model, and year. The methods of the car object might include methods to start the car, turn the car off, and change gears. The make, model, and year properties are hidden from outside, and only the public methods of the car object are exposed. This allows the car object to be used in a variety of ways, without exposing the internal details of the car.

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|----------|-----------|---------|
| (a) (i) | (b) (iii) | (c) (v) |
| (d) (vi) | (e) (vii) | |

- 31) is a visual modeling language that helps software developers visualize and construct new systems.

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| (a) (i) | (b) (ii) | (c) (iii) |
| (d) (iv) | (e) (vii) | |

- 32) A UML is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects.

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|----------|-----------|-----------|
| (a) (i) | (b) (ii) | (c) (iii) |
| (d) (iv) | (e) (vii) | |

- 33) can prevent users from directly accessing its data and this can help to protect the data from being accidentally or maliciously modified.

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|---------|-----------|-----------|
| (a) (i) | (b) (ii) | (c) (iii) |
| (d) (v) | (e) (vii) | |

34) can be used to communicate the requirements of a system to a variety of stakeholders, including users, developers, and managers.

- (a) Only (i) (b) Only (ii) (c) Only (i) and (ii) (d) Only (i) and (iii) (e) (i),(ii) and (iii)

35) Which of the following is/are correct regarding requirement discovery?

- (a) Requirements discovery is done by the systems designer.
(b) Interviews are very time-consuming, and therefore not a costly approach.
(c) Video conferencing facility permits the systems analyst to interview clients who are at distant locations.
(d) The effectiveness of requirement discovery depends on the skills and capabilities of the systems analyst.
(e) When using a Video conferencing facility, we can easily get everyone on the same date, and time.

36) Which of the following is/are correct regarding the *Feasibility* and *Feasibility Analysis*?

- (a) *Cultural feasibility* refers to the assessment of whether a proposed project, policy, or initiative is compatible with the cultural context in which it will be implemented.
(b) *Political feasibility* addresses the following issue.
“How will the working environment of end-users change? Can or will end-users and management adapt to the change?
(c) *Operational Feasibility* is a measure of how well a solution meets the identified system requirements to solve the problem.
(d) *Technical feasibility* refers to the assessment of whether a proposed project, system, or solution can be successfully implemented from a technical standpoint and it involves evaluating the availability of the necessary technology, resources, and expertise to develop, deploy, and maintain the intended solution.
(e) *Operational Feasibility* refers to the assessment of whether a proposed project or initiative is financially viable and economically justifiable and it involves evaluating the potential costs, benefits, and financial implications associated with the implementation and operation of the project.

37) Consider the following statements regarding systems design.

- (i) System design involves the process of defining, designing, and specifying the architecture, components, and functionality of a system and it is a crucial phase in the development lifecycle that translates requirements into a blueprint for the implementation of the system.
(ii) System architecture design defines the overall structure and organization of the system and this includes determining the high-level components, subsystems, and their relationships.
(iii) The tasks that focus on the specification of a detailed computer-based solution are defined in the design stage.

Which of the above statements is/are true?

- (a) Only (i)
(b) Only (ii)
(c) Only (i) and (ii)
(d) Only (i) and (iii)
(e) All

- 38) A/An..... is a graphical representation that illustrates the hierarchical structure of a system or software program and it is a visual tool used in software engineering and system design to show the interrelationships between modules or components within a system.

Which of the following is most suitable to fill the above blanks?

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|--|
| (a) Entity Relationship Diagram
(b) Use case diagram
(c) Class Diagram
(d) Structure Chart
(e) Event Diagram |
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- 39) Consider the following statements regarding the Scope Definition phase.

- (i) Identify the need for the project and establish the initial vision and goals and involves understanding the business requirements, user needs, and the problem or opportunity that the project aims to address.
- (ii) Database management system and the programming language to be used for the project has to be identified during this phase.
- (iii) Prioritize the requirements based on their importance and impact on the project objectives and helps in establishing the critical features and functionalities that need to be included in the scope.

Which of the above statement(s) is/are correct?

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| (a) Only (i) (b) Only (i) and (ii) (c) Only (i) and (iii)
(d) Only (ii) and (iii) (e) (i),(ii) and (iii) |
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- 40) Consider the following statements related to computer ethics.

- (i) Respecting individuals' privacy rights and ensuring the protection of personal information and data.
- (ii) Should not use proprietary software for which you have not paid.
- (iii) Discourages activities such as cyberbullying, online harassment, identity theft, or spreading false information.

Which of the above statements is/are true ?

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| (a) Only (i) (b) Only (ii) (c) Only (i) and (iii) (d) Only (ii) and (iii) (e) (i),(ii) and (iii) |
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