



UNIVERSITY OF COLOMBO, SRI LANKA



UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING
(Successor to the Institute of Computer Technology (ICT), University of Colombo)



DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)
Academic Year 2003/04 - 1st Year Examination – Semester 1

IT1402: Systems Analysis and Design
15th February 2004
(TWO HOURS)

Important Instructions :

- The duration of the paper is 2 (two) hours.
- The medium of instruction and questions is English.
- The paper has **50** questions and **12** pages.
- All questions are of the MCQ (Multiple Choice Questions) type.
- All questions should be answered.
- Each question will have 5 (five) choices with **one or more** correct answers.
- All 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*).
- 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 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.**

1) Which of the statements given below is/are correct regarding the duties of a Systems Analyst (SA)?

- (a) SA chooses a team to conduct a project and leads the team.
- (b) SA studies the problems and needs of an organization.
- (c) SA advises users on why they are inefficient and how they should work.
- (d) SA identifies how staff of an organisation can be reduced by computerization of activities.
- (e) SA facilitates the development of information systems and computer applications.

2) Each statement in Column A has to be matched with the most appropriate one from Column B.

	Column A		Column B
(i)	System Owner	A	A person who analyses the way the system works and its problems
(ii)	System User	B	A person who uses the system to perform or support the work to be completed.
(iii)	System Builder	C	A person who translates system user’s business requirements and constraints into technical solutions.
(iv)	System Designer	D	A person who constructs the system, tests the system and delivers the system into operation.
(v)	Systems Analyst	E	A person who pays for the system to be built and maintained.

Which of the following represent the correct matchings?

- (a) (i) & E, (ii) & B, (iii) & D, (iv) & C, (v) & A
- (b) (i) & B, (ii) & C, (iii) & A, (iv) & D, (v) & E
- (c) (i) & C, (ii) & A, (iii) & D, (iv) & E, (v) & B
- (d) (i) & A, (ii) & D, (iii) & E, (iv) & B, (v) & C
- (e) (i) & E, (ii) & D, (iii) & B, (iv) & C, (v) & A

3) Identify the correct statement(s) from among the following:

- (a) Outsourcing is the act of contracting with an outside vendor to assume responsibility for one or more IT functions or services.
- (b) A stakeholder is any person who designs the system to meet the user’s requirements.
- (c) IT vendors sell hardware, software and services to business for incorporation into information systems.
- (d) Systems Analysis is concerned with organizing the work, ensuring that adequate resources are made available and monitoring the progress of work.
- (e) Legacy systems are older information system applications which are crucial to the day-to-day operation of a business, but may use technologies considered old or outdated by current standards.

4) The problem solving approach usually incorporates the following general steps.

- (i) Design and implement the ‘best’ solution.
- (ii) Analyze and understand the problem.
- (iii) Identify alternative solutions and decide on a course of action.
- (iv) Identify the problem.
- (v) Identify solution requirements or expectations.
- (vi) Evaluate the results.

Select the order in which the above mentioned steps should be performed.

- (a) (ii), (iv), (iii), (i), (v), (vi)
- (b) (iv), (iii),(ii) , (vi), (v), (i)
- (c) (ii), (iv), (v), (iii), (i), (vi)
- (d) (iv), (ii), (v), (iii), (i), (vi)

(e) (iii), (iv), (ii), (v), (vi), (i)

5) Identify the stakeholders of an information system.

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|----------------------|--------------------|---------------------|
| (a) Systems Analysts | (b) System Owners | (c) System Builders |
| (d) System Designers | (e) System hackers | |

6) Which of the statements given below is/are correct regarding system development life cycle?

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| (a) Problem definition phase in the system development life cycle, sets <i>project bounds</i> , which define what part of the system can be changed by the project and what parts are to remain unchanged. |
| (b) System specification phase in the system development life cycle, sets <i>project bounds</i> , which define what part of the system can be changed by the project and what parts are to remain unchanged. |
| (c) During the maintenance phase of the system development life cycle, the following activities will be performed:
- Elimination of errors in the system
- Tuning the system for any variations in its working environment. |
| (d) All life cycle methodologies prescribe exactly the same set of phases and activities. |
| (e) Use of standard methods in systems development helps to eliminate the need for systems documentation. |

7) Which of the statements given below is/are correct regarding system development?

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| (a) A systems development methodology divides the life of an information system into two stages, namely,
-systems development, and
-systems operation and support. |
| (b) A system life cycle divides the life of an information system into two stages, namely,
-systems development, and
-systems operation and support. |
| (c) A systems development process is a set of activities, methods, best practices, deliverables and automated tools which stakeholders use to develop and maintain information systems and software. |
| (d) A modelling method consists of a set of activities, methods, best practices, deliverables and automated tools which stakeholders use to develop and maintain information systems and software. |
| (e) Use of standard methods in the systems development helps users to become familiar with the modelling techniques used by the designers. |

8) Consider the following activities in connection with software development.

- (i) Use a problem-solving approach
- (ii) Establish phases and activities
- (iii) Establish standards

Which of the above is(are) the software development principles?

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

9) Technical feasibility is an evaluation to determine whether

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| (a) the system can provide the right information for the organization's personnel. |
| (b) the existing systems can be upgraded to use the new technology. |
| (c) any restructuring of jobs will be acceptable to the current users. |
| (d) the organization has the expertise to use the new technology. |

(e) the technology needed for the proposed system is available.

10) Each statement in Column A has to be matched with the most appropriate one from Column B.

	Column A		Column B
(i)	Operational Feasibility	A	is an assessment of the maturity, availability and desirability of the computer technology needed for support.
(ii)	Technical Feasibility	B	is used to find whether the solution is cost-effective.
(iii)	Economic Feasibility	C	is a measure of how reasonable the project time table is.
(iv)	Schedule Feasibility	D	is a measure of how well the solution will work in the organization.

The correct matching is

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| (a) (i) & C, (ii) & B, (iii) & A, (iv) & D | (b) (i) & B, (ii) & C, (iii) & D, (iv) & A |
| (c) (i) & A, (ii) & B, (iii) & D, (iv) & C | (d) (i) & A, (ii) & D, (iii) & C, (iv) & B |
| (e) (i) & D, (ii) & A, (iii) & B, (iv) & C | |

11) Which of the statements given below is/are correct regarding feasibility study?

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| (a) It is the measure of how beneficial or practical it is to develop an information system for an organization. |
| (b) Feasibility analysis is first done during the requirement analysis stage. |
| (c) Feasibility analysis is first done during the preliminary investigation stage. |
| (d) A candidate system matrix documents similarities and differences between candidate systems; however, it offers no analysis. |
| (e) A feasibility analysis matrix complements the candidate systems matrix with an analysis and ranking of the candidate systems. |

12) A statement from Column A has to be matched with the most appropriate expression from Column B.

	Column A		Column B
(i)	Context Diagram	A	Shows the flow of data through a system and the processing performed by that system.
(ii)	Data Flow Diagram	B	Is a Function carried out by the business, which transforms or uses data.
(iii)	Process Decomposition	C	Illustrates the system's interface to the business and outside world, including other information systems.
(iv)	Process	D	Is an act of breaking a system into its component subsystems, processes and sub processes.

The correct matching is

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| (a) (i) & B, (ii) & C, (iii) & A, (iv) & D | (b) (i) & C, (ii) & A, (iii) & D, (iv) & B |
| (c) (i) & A, (ii) & C, (iii) & D, (iv) & B | (d) (i) & D, (ii) & C, (iii) & B, (iv) & A |
| (e) (i) & C, (ii) & B, (iii) & D, (iv) & A | |

13) When requirements go wrong, what could happen from among the following?

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| (a) The system may cost more than projected. |
| (b) The system may be delivered later than promised. |
| (c) The system may not meet user requirements. |
| (d) The system will become unreliable and prone to errors. |
| (e) The system development should be outsourced. |

- 14) The statements given below are associated with requirements analysis. Identify the correct statement(s) from among them:

- (a) Requirements are often categorized as functional or nonfunctional requirements.
- (b) Requirement discovery for a system does not depend on the analysts' ability to first discover and then analyze problems and opportunities which exist in the current system.
- (c) A disadvantage of discovery observation of the work environment is that it makes users feel uncomfortable being watched.
- (d) Fact gathering is the formal process of using techniques to collect information about systems requirements.
- (e) Questionnaires are special purpose documents which allow the analysts to collect information and opinions from a large audience in a more expensive way.

- 15) Data flow diagrams have a number of features which can be used to ensure that they are self-explanatory, complete and unambiguous. Identify those features from among the following.

- (a) Have data flows which split up into a number of other data flows
- (b) The absence of flowchart structures
- (c) Good naming conventions
- (d) Include data flows which act as signals to activate processes
- (e) Conservation of data

- 16) Column A contains some key words associated with describing data. A word from Column A has to be matched with the most appropriate phrase from Column B.

	Column A		Column B
(i)	Organization Chart	A	Is a special purpose document that allow the analysts to collect information and opinions from a large audience in a relatively cheap way.
(ii)	Questionnaire	B	allows users and developers to experiment with the software and develop with an understanding
(iii)	Prototyping	C	is a document the analyst will first look at during his investigation.
(iv)	Joint Application Development	D	is a process whereby highly structured group meetings are conducted to analyze problems and define requirements.
(v)	Site Visits including Research	E	is one of the requirements discovery methods.

The correct matching is

- (a) (i) & E, (ii) & D, (iii) & C, (iv) & A, (v) & B
- (b) (i) & A, (ii) & E, (iii) & C, (iv) & B, (v) & D
- (c) (i) & C, (ii) & A, (iii) & B, (iv) & D, (v) & E
- (d) (i) & A, (ii) & B, (iii) & D, (iv) & E, (v) & C
- (e) (i) & D, (ii) & E, (iii) & B, (iv) & C, (v) & A

- 17) Identify, from among the following, the correct statements related to the requirements discovery method, namely 'Observing the work environment'.

- (a) Data gathered by observation will not be highly reliable.
- (b) It is a relatively expensive process.
- (c) One disadvantage is that the tasks being observed are subject to various types of interruptions.

- (d) Work being observed may not involve the level of difficulty or volume normally experienced.
- (e) It does not allow a system analyst to do work measurements

- 18) Consider the following statements in relation to requirements discovery methods.
- (i) A disadvantage of using a questionnaire is that it is not possible for the systems analyst to observe and analyze the respondent's body language.
 - (ii) Good questionnaires are very difficult to prepare.
 - (iii) An advantage of an interview is that it permits the analyst to adapt or reword questions for each individual.

Which of the above statements is/are correct?

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

- 19) Which of the following is a(are) fact-finding technique(s)?

- (a) Joint requirements planning
- (b) Research and site visits
- (c) Sampling of existing documents
- (d) Rapid application development
- (e) Prototyping

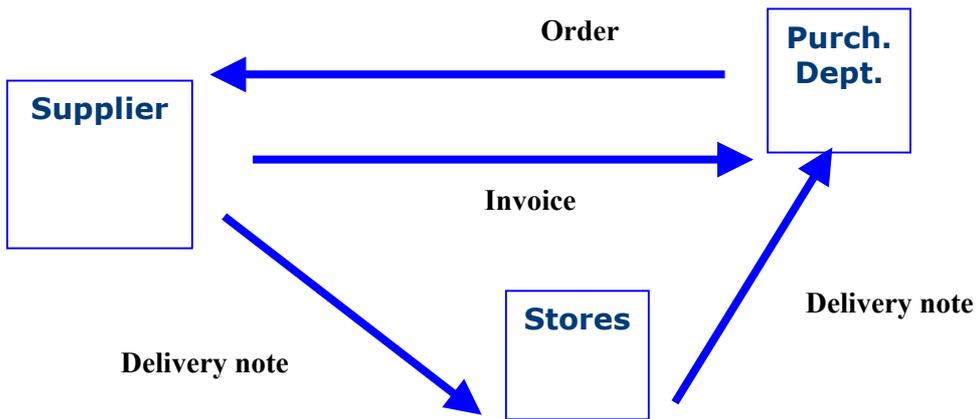
- 20) Identify, from among the following, the advantages of using interviews as a fact gathering technique.

- (a) Very cheap technique
- (b) New ideas may arise
- (c) Permit the analyst to ask questions from each individual etc.
- (d) Allow the analyst to look for more feedback from the interviewee
- (e) Give the analyst an opportunity to motivate the interviewee to respond freely and openly to questions

- 21) From among the statements given below, identify the correct ones which are associated with document flow diagrams:

- (a) It is used to examine the flow of documents within the existing system.
- (b) Document flow diagrams show the flow of physical goods through the system.
- (c) The first task in creating a document flow diagram is to convert each source & recipient of a document into an external entity symbol.
- (d) It enables one to understand the workflow of the existing system.
- (e) It can be used to define the system boundary.

- 22) Consider the following document flow diagram:



From among the statements given below, identify the correct ones associated with the above diagram.

- (a) Supplier is an external entity for the system.
- (b) Stores can be an external entity depending on the system boundary.
- (c) Invoice document originates from the Purchasing Department.
- (d) Invoice document originates from the Supplier.
- (e) When one draws the context data flow diagram for the above system, Supplier, Stores and Purchasing Department will be external entities.

23) Identify, from among the following, the correct statement(s) associated with process descriptions:

- (a) A decision tree is a method used to describe process logic.
- (b) A decision table can be used to specify the decision logic in a process.
- (c) Using a decision table, logic involving multiple conditions can be described in a better way.
- (d) Natural English is too imprecise and subject to misinterpretation to be used in specifying process logic.
- (e) Data flow diagrams are very effective tools for showing the logic inside the processes.

24) Consider the following statements in relation to process models.

- (i) In a data flow diagram based on Gane & Sarson notations, circles are used to represent processes.
- (ii) In a data flow diagram based on Gane & Sarson notations, arrows are used to represent data flows.
- (iii) Elementary processes are the lowest level of detail when depicted in a process model.

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

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

The blanks in the Questions 25 – 28 have to be filled by selecting the most appropriate words/phrases from the list labelled (a) – (e). Note that one word/phrase may be used in more than one instance.

- (a) Decomposition

- (b) Context Diagram
- (c) Data Flow Diagram
- (d) Entity Relationship Diagram
- (e) Decision table

What is the most appropriate way of filling?

- 25)is an act of breaking a system into its component subsystems, processes and sub processes.
- 26) The three components of a(n) are: (1) condition stubs, (2) action stubs and (3) rules.
- 27)illustrates the system's interface to the business and outside world, including other information systems.
- 28)shows the major data flows into and from the application, and the system boundaries.

The blank in the Question 29 has to be filled by selecting the most appropriate words/phrases from the list labelled (a) – (e).

- a. A relationship
- b. Degree
- c. Cardinality
- d. Association
- e. Many to many relationship

- 29) defines the minimum and maximum number of occurrences of one entity which may be related to a single occurrence of the other entity.

What is the most appropriate way of filling?

- | | |
|-------------------------------|-----------------|
| (a) A relationship | (b) Degree |
| (c) Cardinality | (d) Association |
| (e) Many to many relationship | |

- 30) The following incomplete statement when completed should describe an identifier in entities.
 A is the candidate key that will most commonly be used to uniquely identify a single entity instance.
 Fill in the blank in the statement with the most appropriate word or phrase.

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|----------------------|-----------------|------------------|
| (a) alternate key | (b) foreign key | (c) compound key |
| (d) concatenated key | (e) primary key | |

- 31) A group of attributes which uniquely identifies an instance of an entity is called a

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|--------------------|--------------------|-----------------------|
| (a) compound key. | (b) composite key. | (c) concatenated key. |
| (d) alternate key. | (e) foreign key. | |

- 32) Gane and Sarson shape used to represent processes or work to be done is

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|------------------|--------------------------|---------------|
| (a) a rectangle. | (b) a rounded rectangle. | (c) a square. |
| (d) a circle. | (e) an ellipse. | |

- 33) Identify, from among the following, the correct statements in relation to process modelling.

- (a) Logical models are implementation dependent and show what a system is or does.
- (b) Physical models show how the system is physically and technically implemented.
- (c) A data flow diagram shows the flow of data through a system and the work or processing performed by that system.
- (d) A decomposition diagram shows the top down functional decomposition and structure of a system.
- (e) An entity relationship diagram is a modelling method used in data modelling.

34) From among the statements given below, identify the correct ones associated with data flow diagrams.

- (a) There are several competing symbol sets for data flow diagrams.
- (b) Processes on a data flow diagram can operate in parallel.
- (c) Data flow diagrams can show processes which have dramatically different timing.
- (d) A context data flow diagram defines the scope and boundary for the system and project.
- (e) A context data flow diagram can contain one or more processes.

35) From among the following, identify the illegal data flows in a data flow diagram.

- (a) External entity to another external entity
- (b) Data Store to a process
- (c) Data Store to an external entity
- (d) External entity to a data store
- (e) Data store to a data store

36) Structured design seeks to factor a program into the top-down hierarchy of modules which have the following properties/property:

- (a) Loosely cohesive
- (b) Highly cohesive
- (c) Loosely coupled
- (d) Tightly coupled
- (e) Inherited

The blanks in the Questions 37 – 39 have to be filled by selecting the most appropriate words/phrases from the list labelled (a) – (e). Note that one word/phrase may be used in more than one instance.

- (a) thin client
- (b) flat client
- (c) client/server system
- (d) transaction server
- (e) database management system

What is the most appropriate way of filling?

- 37) A acts only as a terminal.
- 38) A is a solution in which the presentation, presentation logic, application logic, data manipulation and data layers are distributed between client PCs and one or more servers.
- 39) A is a personal computer that does not have to be very powerful (or expensive) in terms of processor speed and memory.
- 40) Consider the following statements in relation to system design.
 - (i) The physical data flow diagram is used to establish the physical processes and data stores across

- a network.
- (ii) The prototyping approach is an interactive process involving a close working relationship between the designer and the users.
 - (iii) Object diagrams show how objects interact with one another via messages in the execution of a use case or operation.
 - (iv) State diagrams are used to model the dynamic behavior of a particular object.

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

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

When answering questions 41-45 use the following Video library case study.

Atlantic Video Library specializes in obscure videos. It lends videos only to members of the video society, which is part of an exclusive and very expensive Gentlemen's club. Any member of the club automatically becomes a member of the video society. New members are admitted only on 1st January each year.

The library is set up along conventional lines, and there are no restrictions on the number of videos members may borrow at any one time. Videos have to be returned only if required by another member. Most of the active users of the library regularly change their videos. Two or three copies of popular titles are available.

In order to borrow a video, a member selects it, takes it to the issue desk and gives the video and his club membership card, to the librarian. The librarian takes the video ID card from the video sleeve and adds the membership number to the card. The librarian then places the card into the loan file and the member leaves with his video. This same procedure is followed in respect of each video borrowed.

When a member returns a video, he hands over the video to the librarian. The librarian finds the video card in the loans file and places the card in the video sleeve before returning the video to the library shelves not forgetting to remove the member number from the video card.

To reserve a video which is already on loan, the member gives the details of the video and the membership number to the librarian. The librarian finds the relevant video card in the loans file, and adds the member's number to the reservation column on the video card. The librarian also makes a note of the member who has the video on loan and completes a return request card addressed to the member. The address is taken from the library copy of the club membership book. When the reserved video is returned, the librarian puts the video under the counter and completes a reservation ready card addressed to the member who requested the reservation. The member requiring the video can then pick the video up from the library and have it issued in the usual manner. Members make many inquiries from the librarian. Typical questions include- "Is the video titled 'abc' on loan?", "Which videos did actor 'xyz' appear in?", "Have you got any videos on subject 'def'?" and so forth. The librarian is able to answer these questions by inspecting the loan file, the actor index, the subject index and the title index.

In addition to the above duties, the librarian receives new videos from the social committee of the club. On receipt of a new video, the librarian has to make a video card for insertion in the video sleeve and then insert relevant entries for the indexes. The librarian is also responsible for

amending the library copy of the membership book with changes of the addresses and at the end of the year , collecting the new membership book from the club secretary.

Note : The selection, ordering and payments for the videos are not considered relevant within the terms of the case study.

41) Considering the above case study, identify the people and other sources of fact gathering.

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|-------------------|--------------------------|
| (a) Club chairman | (b) Library assistant |
| (c) Club members | (d) Club membership book |
| (e) Librarian | |

42) If one is asked to draw the document flow diagram for the above case study, out of the following, what would be the documents to be identified?

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| (a) Club membership card | (b) Video ID card |
| (c) National Identity card | (d) Membership renewal form |
| (e) Reservation ready letter | |

43) Which of the following statements is/are true with respect to the given case study?

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| (a) Club Secretary is an external entity in the context diagram. |
| (b) Social committee will be an external entity in one system. |
| (c) Return request letter is a document identified for the document flow diagram. |
| (d) Library clerk collects fines from the members who do not return the videos in time. |
| (e) Loan file can be considered as a source of fact gathering. |

44) From among the following, identify the possible data stores for the above system.

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| (a) Borrowing details | (b) Membership book | (c) Overdue details |
| (d) Inquiries | (e) Reservation details | |

45) Which of the following statements is/are true with respect to the given case study?

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| (a) <i>Check Overdue Videos</i> will be a possible process identified for the system. |
| (b) There has to be a process <i>Check Over limit</i> that will check whether a member has already borrowed the maximum limit allowed. |
| (c) <i>Video Issues</i> will be a top level process in the data flow diagram. |
| (d) <i>Video Reservations</i> will be a process in the context data flow diagram. |
| (e) <i>Reservation details</i> will be a data store identified for the context data flow diagram. |

46) From among the statements given below, identify the correct ones associated with object modelling.

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| (a) A <i>class</i> is a set of objects which share the same attributes and behaviour. |
| (b) <i>Polymorphism</i> means that the same named behaviour may be completed differently for different objects/classes. |
| (c) By identifying aggregation relationships, one can partition a very complex object and assign behaviours and attributes to the individual objects within it. |
| (d) Use case diagrams show how objects interact with one another via messages. |
| (e) Association, aggregation and inheritance are the three types of relationships which can exist between objects. |

47) Consider the following statements in relation to automated tools and technology.

- (i) CASE tools are designed to automate the stages of systems development.
- (ii) Re-engineering allows a CASE tool to read existing program code and transform that code into a representative system model that can be edited and refined by the systems.
- (iii) CASE Repository is a system developer's database where developers can store system models, detailed descriptions and specifications, and other products of systems development.

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) All | |

48) Which of the following statements is/are true with respect to Project Management?

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| <ul style="list-style-type: none"> (a) PERT chart is a graphical, hierarchical model that shows a project's tasks and the relationships between those tasks. (b) Gantt charts offer the advantage of clearly showing the overlapping tasks, that is, the tasks that can be performed at the same time. (c) Microsoft Project is an example of project management software. (d) PERT charts are more effective when one wants to study the relationships between the tasks. (e) Project Management is the process of scoping, planning, staffing, organizing, directing and controlling the development of an acceptable system at a minimum cost within a specified time frame. |
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49) Which of the following statements is/are true with respect to Automated tools?

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| <ul style="list-style-type: none"> (a) Using a CASE tool, one can reverse engineer a poorly designed system into a system model, edit and improve that model, and then forward engineer the new model into an improved system. (b) Forward engineering requires a CASE tool to read the existing program code and transform that code into a representative system model that can be edited and refined by the systems analyst. (c) Power Builder is an example of an Application Development Environment. (d) Descriptive tools are used to record, delete, edit and output detailed documentation and specifications. (e) Symantec's Visual Café is a CASE tool. |
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50) Which of the following statements is/are true with respect to documentation?

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| <ul style="list-style-type: none"> (a) A configuration management stores all documents created during the development process. (b) Documentation is a communication tool since it contains a repository of all work done to date and makes it available to all persons working on related parts of a large project. (c) The document configuration is the system used to keep track of all documents in a project. (d) A configuration management organizes documents in ways which allow work to be |
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tracked throughout the development process, usually by linking documents to the development phases.

- (e) The documents stored in a configuration management system depend on the development process and the modelling methods used.
