



UNIVERSITY OF COLOMBO, SRI LANKA



UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)

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***IT2402: Fundamentals of Software Engineering***

***Multiple Choice Question Paper***

**15<sup>th</sup> August, 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 11 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.
- The questions will be arranged, as far as possible, in an increasing order of difficulty.
- 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 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) Identify, from among the following, the correct statement(s).

- (a) One of the main challenges facing Software Engineering today is the requirement of most software systems to work with a multitude of heterogeneous systems.
- (b) 'Legacy systems' are custom developed software systems for the legal domain.
- (c) Software does not wear-out in the traditional sense of the term, but software does tend to deteriorate as it evolves.
- (d) Since software is essentially 'intangible' it is relatively easy to manage software projects.
- (e) With the advent of component based software assembly, we find that only less than 20% of today's software is still custom built.

2) Software Engineering:

- (a) Is a set of rules about developing software products.
- (b) Has been around as a discipline since the early 50's
- (c) Started as a response to the so-called 'Software Crisis' of the late 60's
- (d) Is an engineering discipline concerned with all the aspects of software production.
- (e) Is now a mature discipline on par with other established engineering fields.

3) Identify, from among the following, the correct statement(s).

- (a) With the availability of low-cost high-performance hardware, the need for writing efficient software has considerably diminished.
- (b) Software is said to be usable if can be used, without undue effort, by the type of user for whom it is intended.
- (c) Emergent properties of a system are those that emerge only as a result of investigating the properties of its constituent parts.
- (d) A software product designed so that it can easily evolve to meet the changing needs of its clients is said to be maintainable.
- (e) An important attribute of good software is its dependability; which includes its responsiveness, processing time, and memory utilization.

4) Read the following paragraph and identify the correct statement(s).

"Imagine that you were recently hired as a software engineer to a company that specializes in aircraft navigation control software. While orientating yourselves to the company's work practices, you observe that they in fact do not conduct a few tests that they should in order to comply with the relevant safety standard. When you inquire about this from the project manager, he dismisses it saying that those tests are really unnecessary (and takes an unreasonably long time to conduct, as well as being superfluous) and that they have managed with the other tests for so long, without any problems."

- (a) You should immediately resign from the company and file a complaint with the relevant standard institution.
- (b) You should do nothing and let the matter slide.
- (c) Although you are new to the company, and you hardly know anything about the internal processes and politics, you should insist on the company changing its work practices immediately; failing which you threaten to report the matter.
- (d) Since you are new to the company, and you are unfamiliar with the internal processes and politics, you should first find-out more about the issue and its background.
- (e) None of the above statements are correct.

5) The Waterfall Model of the software development process:

- (a) Describes the most appropriate process model for projects with unstable requirements
- (b) Has its origins in other engineering disciplines.
- (c) Take its name from the fact that process activities cascade from one phase to the next.
- (d) Suffers from its inflexible partitioning of the project into few distinct phases.
- (e) Prohibits any kind of feedback from a phase to any of its preceding ones.

6) With regard to Evolutionary development, identify the correct statement(s).

- (a) Evolutionary development usually comes in two flavours; Exploratory development, and throw-away prototyping
- (b) Very large projects are natural candidates for an evolutionary development based approach.
- (c) Exploratory development is used in situations where most of the requirements are well understood in advance.
- (d) One of the strong points of evolutionary development is that it facilitates easy project management, through the high volume of documentation it generates.
- (e) Often the construction of a throw-away prototype is followed by a reimplementing of the system using a more structured approach.

7) Formal Systems Development is:

- (a) A variation of the waterfall model with more strict guidelines for the production of documentation.
- (b) An industry standard for software requirement validation endorsed by the IEEE
- (c) An approach where the development process is based on formal mathematical transformation of a system specification to a working program.
- (d) A set of guidelines for creating robust software systems.
- (e) Not widely used as the evolutionary model.

8) Reuse-oriented Development:

- (a) Reduces cost and risk because it bring-down the amount of software to be developed.
- (b) Is not suitable for large software projects.
- (c) Always results in a system whose evolution is totally under the control of its developers.
- (d) Often lead to some degree of requirement-compromise and therefore may lead to a system which does not exactly satisfy the user needs.
- (e) Relies on a large available base of reusable software components and integrating frameworks.

9) Incremental development approach:

- (a) Is another name for exploratory prototyping.
- (b) Allows customers (and developers) to delay decisions on detailed requirements until they have some experience with the system.
- (c) Suggests that the most important and high risk requirements are tackled first
- (d) Mandates that the same process is used in every increment
- (e) Do not reduce the overall risk of project failure.

10) The Spiral Model of software development:

- (a) Was first proposed by Boehm
- (b) Specifies exactly which phases to have
- (c) Represents a phase of the software process by a loop in the spiral
- (d) The project starts at the innermost loop of the spiral and progresses outwards
- (e) Explicitly considers the risks involved in the process

11) Evolutionary prototyping:

- (a) Requires rapid software development
- (b) Interleaves specification, design, and implementation
- (c) Does not involve end-users in testing the prototype.
- (d) Requires exhaustive verification of the system against the initial specification.
- (e) Is suitable for the development of critical systems.

12) Software engineering is different from other established engineering disciplines, making software management especially harder. Some of these differences are:

- (a) Outsourcing parts of the development work is not done in software projects.
- (b) Standard software processes are not as well established as the 'processes' in other engineering fields.
- (c) The software product is intangible, hence tracking of project progress is difficult
- (d) The risks involved in software engineering are considerably lower than in other engineering fields.
- (e) The percentage of 'one-off' projects present in the software industry is higher than in other engineering fields.

13) Which of the following activities are not found in the work of a software project manager?

- (a) Proposal writing
- (b) Personal selection and evaluation
- (c) Drafting and evolving the organizational quality policy
- (d) Finding new clients for the software product
- (e) Project planning

14) The Project Plan:

- (a) Is a project management document created at the start of the project and finalized before implementation starts
- (b) Is always a single document that lays down the project's management outline.
- (c) Is a project management document which specifies the project's schedule and cost invariants and needs to be strictly adhered-to throughout the lifetime of the project.
- (d) Should not include information about possible risks and risk mitigation strategies.
- (e) Evolves as more information becomes available.

15) The project schedule:

- (a) Can be graphically illustrated by bar charts
- (b) Can be shortened by compressing durations for tasks not in the critical path
- (c) Needs to be strictly followed, and staying well ahead of the project schedule is always a sign of project success.
- (d) Is always finalized ahead of the development phase.
- (e) Can be illustrated by using activity networks

16) In the context of 'software requirement analysis and specification', identify the correct statement(s).

- (a) The end-users and the customer often have a clear idea of what they expect from the system and the task of the analyst is to record this information properly.
- (b) Analysts have to discover every single requirement of the system in order for the creation of the initial requirement specification.
- (c) Both functional and non-functional requirements need to be captured during requirement analysis.
- (d) Non-functional requirements describe constraints on the services or functions offered by the system.
- (e) Domain requirements are services that have to be implemented because the project's domain mandates them.

17) Identify, from among the following, the correct statement(s).

- (a) Stakeholders of a software project are those who are effected as a result of the software project
- (b) Stakeholders of a software project are those who have a financial interest in the project
- (c) Viewpoint oriented elicitation is a software requirement analysis method where different perspectives on the problem is considered
- (d) A 'scenario' is a requirement elicitation meeting between the analysis and the end-user.
- (e) Different stakeholders may have different viewpoints and as a result may demand often conflicting requirements

18) Since software systems exist in a wider social and organizational context, observational techniques for understanding their interactions are vital. Example(s) of these technique is/are:

- (a) Orgonapathy
- (b) Social Context Index
- (c) Ethnography
- (d) Jackson's situational observation technique
- (e) Socialography

19) Requirement validation is:

- (a) Concerned with finding problems with the requirements.
- (b) About proving that the system correctly implements the requirements.
- (c) Accomplished through unit and integration testing.
- (d) About showing that the requirements actually define the system that the customer wants.
- (e) Part of the requirement verification but is performed before a detailed requirement specification is developed.

20) Which of the following are typically contained in a Software Requirement Specification?

- (a) A glossary of terms
- (b) Non-functional requirements
- (c) Project Schedule
- (d) Project cost baseline
- (e) Functional requirements

21) Component based software engineering emerged as a reuse-based approach to software systems development. But there are some difficulties associated with the component based development.

The main difficult(y)ies related to component based development is(are) ,

- (a) the designing of the system architecture
- (b) the change of application requirements
- (c) implementation of the system
- (d) integrating reusable components
- (e) unavailability of source code of the components

22) Which of the following statements is(are) correct regarding verification and validation?

- (a) Code walkthroughs is a verification activity.
- (b) Planning of verification and validation should start at the implementation stage.
- (c) Validation ensures that the software meets the expectations of the customer.
- (d) Software inspections may be used as a verification technique.
- (e) Debugging is a process similar to verification and validation.

23) Stress testing,

- (a) tests the failure behaviour of the system.
- (b) more relevant to distributed systems
- (c) tests every possible program execution sequence.
- (d) takes place when modules are integrated to create larger systems.
- (e) carried out as a part of the coding task.

24) Consider the following test phases.

- (i). Unit test
- (ii). Acceptance test
- (iii). System test

Which of the following give(s) the correct combination of techniques that can be used in the above test phases respectively?

- |  |  |
|--|--|
| (a) (i) Stress test (ii) Black box (iii) White box | (b) (i) White box (ii) White box (iii) Stress test |
| (c) (i) White box (ii) Black box (iii) Stress test | (d) (i) Black box (ii) White box (iii) Stress test |
| (e) (i) Black box (ii) Black box (iii) Stress test |  |

25) Which of the following statements is (are) correct related to Alpha and Beta testing?

- |  |
|--|
| (a) Alpha testing tests the system with actual data.             |
| (b) At the end of the Beta testing the system is ready for sale. |
| (c) Alpha testing tests the system with the simulated test data. |
| (d) Beta testing is also called as "Acceptance testing".         |
| (e) Beta testing follows alpha testing.                          |

26) The following statements are associated with a certain test strategy called (A)

- (i). Test plan can be based on requirements specification
- (ii). The author of the test plan can be System analyst or Customer
- (iii). The technique that can be used is Black box.
- (iv). The customer will do the testing.

What would be A from among the test strategies given below.

- |                         |                        |                  |
|-------------------------|------------------------|------------------|
| (a) Integration testing | (b) Acceptance testing | (c) Unit testing |
| (d) Alpha testing       | (e) Beta testing       |                  |

27) A completed module was handed over to a programmer(A) for testing. He just passed some values to see whether it gives the desired output. What is the technique that he has used to test?

- |               |                 |              |
|---------------|-----------------|--------------|
| (a) White box | (b) Black box   | (c) Top down |
| (d) Bottom up | (e) Stress test |              |

28) From the list given below, identify the correct contents of a test plan

- |                      |                                       |                          |
|----------------------|---------------------------------------|--------------------------|
| (a) Class diagrams   | (b) Description of items to be tested | (c) Development language |
| (d) Usecase diagrams | (e) Testing schedule                  |                          |

29) In Amature programming

- |  |
|--|
| (a) author may be the programs only user.  |
| (b) involves large and complex systems to be operated and maintained by many people. |
| (c) Concerns about the elegance or style with which the software is written.         |
| (d) Concerns about the clarity of the documents.                                     |
| (e) Concerns only about the correctness of the solution.                             |

30) Pseudocode as a design tool,

- |  |
|--|
| (a) Approximates the format of a programming language and is therefore easier to be translated into a program. |
| (b) Easier to follow as many people find diagrams, easier to follow than text.                                 |
| (c) Does not allow for the definition and scoping of data.   |
| (d) Good vehicle to design logic.  |
| (e) Enforces adherence to structured programming concepts.   |

31) Which of the following is(are) can be reasons for group of statements to appear in a single module?

- (i). The statements are all necessary to perform one particular task.
- (ii). The statements encompass a variety of small unrelated tasks but as these must be performed at the same time.
- (iii). The statements perform two or more related tasks which are always performed together.

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

32) One aim of designing a program module is to pass required data by means of independent formal parameters rather than to operate on data for general use. This ensures,

- |                         |                        |                          |
|-------------------------|------------------------|--------------------------|
| (a) High cohesion       | (b) Low cohesion       | (c) High module coupling |
| (d) Low module coupling | (e) Information hiding |                          |

33) Which of the following is(are) the benefits of software reusability?

- |                               |                                  |                  |
|-------------------------------|----------------------------------|------------------|
| (a) Accelerated development   | (b) Increased reliability        | (c) Tool support |
| (d) Reduced maintenance costs | (e) Effective use of specialists |                  |

34) Consider the following scenario.

An Invoice\_collection contains several Invoices. A Customer-invoice is one kind of invoice. A particular Customer-invoice is related to a particular customer.  
Consider the relationships between the following classes in a class diagram.

- (i). Invoice\_collection and Invoice
- (ii). Customer-invoice and Invoice
- (iii). Customer-invoice and Customer

Which of the following represents the correct relationships between the above classes respectively.

- |                     |                  |                   |
|---------------------|------------------|-------------------|
| (a) (i) aggregation | (ii) inheritance | (iii) association |
| (b) (i) aggregation | (ii) association | (iii) inheritance |
| (c) (i) inheritance | (ii) aggregation | (iii) association |
| (d) (i) association | (ii) inheritance | (iii) aggregation |
| (e) (i) association | (ii) aggregation | (iii) inheritance |

35) Fill in the blank.

.....is an intellectual tool which permits one to concentrate on a problem at some level of generalization without regard to irrelevant low level details.

- |                 |                        |                 |
|-----------------|------------------------|-----------------|
| (a) inheritance | (b) polymorphism       | (c) abstraction |
| (d) aggregation | (e) information hiding |                 |

36) Consider the following statements related to colour in user interfaces?

- (i). Colour change can be used to show a change in system status
- (ii). Use as many number of colours in a system interface
- (iii). Colour can be used to represent meaning
- (iv). Should be careful about colour parings

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

- |                        |                              |                             |
|------------------------|------------------------------|-----------------------------|
| (a) ALL                | (b) (i) and (iv) only        | (c) (i), (ii) and (iv) only |
| (d) (ii) and (iv) only | (e) (i), (iii) and (iv) only |                             |

37) Consider the following scenario.

ABC company has several employees. For each employee company keeps track of that employee's last name, first name, gender, address, data joined and birth date. There are two kinds of employees in the company as Salary employees and Hourly employees. For Salary employees company is interested in their annual salary. For Hourly employees company is interested in knowing their Houlry\_Pay\_Rate.

Which of the following gives the Classes in an Object Oriented design in the above scenario?

- |   |
|---|
| (a) Last_name, First_name, Gender, Address, Date_joined, Birth_date                                     |
| (b) Employee, Salaried_employee, Hourly_employee  |
| (c) ABC company, employee, Annual salary, Hourly pay rate,  |
| (d) Last_name, First_name, Gender, Address, Date_joined, Birth_date, annual_salary, Hourly_rate         |
| (e) Last_name, First_name, Gender, Address, Date_joined, Birth_date, Salaried_employee, Hourly_employee |

38) Which of the following programming languages is (are) Object Oriented programming languages?

- |                  |                |       |
|------------------|----------------|-------|
| (a) Visual Basic | (b) Pascal     | (c) C |
| (d) Java         | (e) Visual C++ |       |

39) Which of the following is(are) factor(s) that influence in selecting a programming language to be used to implement a piece of software.

- |                                |  |
|--------------------------------|--|
| (a) Size of the application    | (b) Environment in which the application is to run |
| (c) Performance required       | (d) Security required                              |
| (e) Interface to other systems |  |

40) Which of the following improves the reliability of code?

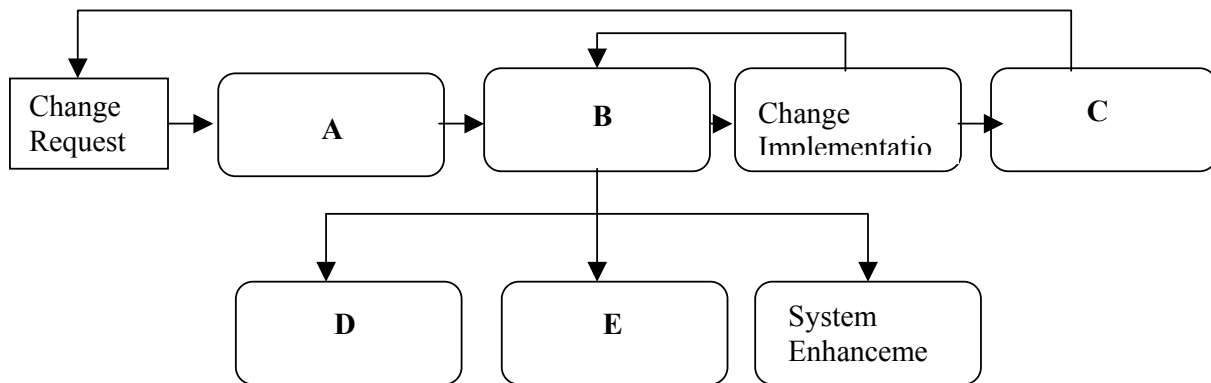
- |  |  |
|--|--|
| (a) Use of Recursion                   | (b) Use of GOTO statements                                       |
| (c) Precise or formal specification    | (d) Using constants other than using numbers and strings in code |
| (e) Careful planning of test strategy. |  |

41) The following statements are associated with Software maintenance. Which of these statements belong to the type of maintenance done to repair software faults?

- |   |
|---|
| (a) Maintenance necessary when the system requirements change in response to organizational or business changes |
| (b) Is also known as adaptive maintenance   |
| (c) Highest maintenance effort is associated with this type of maintenance                                      |
| (d) Is needed when some aspect of the system's environment changes  |
| (e) Maintenance done to correct requirement errors  |



- 42) The diagram given below shows an overview of the maintenance process.



Use the above diagram to find a match between Column 1 and Column 2.

Column 1	Column 2
A	I Release Planning
B	II Platform adaptation
C	III Impact analysis
D	IV System release
E	V Fault repair

The correct matching is:

- |   |   |
|---|---|
| (a) A – I, B – IV, C – V, D – II, E – III | (b) A – III, B – I, C – IV, D – V, E – II |
| (c) A – IV, B – V, C – II, D – III, E – I | (d) A – V, B – II, C – III, D – I, E – IV |
| (e) A – II, B – III, C – I, D – IV, E – V |   |

- 43) Identify from among the following statements those that are correct with reference to architectural evolution.

- |  |
|--|
| (a) Companies are increasingly maintaining all facilities on a single site rather than physically distributing their organization<br>(b) The costs of buying and maintaining a distributed client-server system are usually much less than the costs of buying a mainframe computer of equivalent power<br>(c) Many legacy mainframe systems provide form based character interfaces<br>(d) The older the system, the more difficult it will be to modify its architecture<br>(e) In most legacy systems, user interface facilities, services and data access are intermingled |
|--|

- 44) From among the statements given below, identify those that are correct with respect to a configuration database.

- |  |
|--|
| (a) A configuration database may be maintained as a separate system from the version management system<br>(b) Some integrated CASE tools support integration of the configuration database and the version management system<br>(c) A configuration database cannot answer a query about system configurations such as which customers have taken delivery of a particular version of the system<br>(d) The principal functions of a configuration database are to assist with assessing the impact of system changes and to provide management information about the CM process<br>(e) A disadvantage of a configuration database integrated with the version management system is that the configuration items may be changed without going through the configuration database |
|--|

- 45) The following statements labelled I to V are associated with the change management process. Arrange the statements in the correct order in which they should be carried out.

- (i). Record change request in database
- (ii). Analyse change request
- (iii). If change is valid then
- (iv). Request change by completing a change request form
- (v). Assess how change might be implemented

The correct order is:

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

- 46) The following statements are associated with software quality management. Which of these statement/s is/are true?

(a) Quality management should not be separated from project management so that quality is not compromised by management responsibilities
(b) An independent team should be responsible for quality management and should report to management above the project manager level
(c) The quality management team should take organization-wide responsibility for quality management
(d) ISO 9001 is a generic model of a quality process, which is not industry-specific
(e) Quality planning is the establishment of a framework of organizational procedures and standards, which lead to high-quality software

- 47) Column 1 and Column 2 of the following table has statements associated with Software product metrics. Match a statement in Column 1 with that of a Column 2.

Column 1	Column 2
I Fog Index	P Is a measure of the number of functions that call some other functions
II Length of Code	Q The longer these are the more understandable the program
III Length of Identifiers	R The larger this is of a program component, the more complex and error-prone that component is likely to be
IV Fan-in/Fan-out	S This is a measure of the average length of words and sentences in documents
V Depth of conditional nesting	T Higher this measurement, harder to understand the program and are potentially error-prone

The correct matching is:

(a) I – R, II – Q, III – P, IV - T, V- S	(b) I – Q, II – P, III – T, IV - S, V- R
(c) I – S, II – R, III – Q, IV - P, V- T	(d) I – P, II – T, III – S, IV - R, V- Q
(e) I – T, II – S, III – R, IV - Q, V- P	

- 48) From the statements given below, identify those that cause defects in Software.

(a) Error in design logic	(b) Inaccurate or incomplete documentation
(c) The selection of project type & task set	(d) Number of potential users
(e) Misinterpretation of customer communication	

- 49) Following statements are associated with quality standards. Identify the statement/s that deal with ISO9000 quality standard.

- |   |
|---|
| (a) Is a quality assurance standard that applies to software engineering<br>(b) Describes the elements of a quality assurance system in generic terms<br>(c) Can be applied to any business regardless of the products or services offered<br>(d) In order to register for this standard, twenty requirements have been delineated<br>(e) Treats an enterprise as a network of interconnected processes |
|---|

- 50) Consider the contents of Column 1 and Column 2. The metrics given in Column 1 are further described in Column 2. Match the contents of the two columns correctly.

Column 1		Column 2	
I	MTBF	P	The average time between observed system failures
II	MTTF	Q	A metric used in non-stop systems where users expect the system to deliver a continuous service
III	MTTR	R	A basic measure from which productivity metrics can be computed
IV	AVAILABILITY	S	Mean time to failure
V	LOC	T	An indirect measure of the maintainability of software

Correct matching is:

- |   |   |
|---|---|
| (a) I – S, II – T, III – Q, IV – R, V – P | (b) I – P, II – S, III – T, IV – Q, V – R |
| (c) I – T, II – Q, III – R, IV – P, V – S | (d) I – Q, II – R, III – P, IV – S, V – T |
| (e) I – R, II – P, III – S, IV – T, V – Q |   |

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