Singapore Institute of Management
BSc in Computing & Information Systems
CIS 210 Revision Test Solution
August 2002, 50 minutes

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1. How do software characteristics differ from hardware characteristics? [2.5 marks]

Answer (Section 1.2.1):

- Software is developed, not manufactured.
- Software does not wear out.
- Most software is custom built, not assembled out of components.

2. Why are evolutionary models considered by many to be the best approach to software development in a modern context? [5 marks]

Answer: (Section 2.7)

Because time lines for the development of modern software are getting shorter and shorter, customers are becoming more diverse (making the understanding of requirements even harder), and changes to requirements are becoming even more common (before delivery), we need a way to provide incremental or evolutionary delivery. The evolutionary process accommodates uncertainty better than most process models, allows the delivery of partial solutions in an orderly and planned manner, and most importantly, reflects what really happens when complex systems are built.

3. How does preventive maintenance differ from adaptive maintenance? [4 marks]

Answer:(Section 2.1)

- Preventive Maintenance is to make future maintenance events more viable and less costly consists of reverse engineering and re-engineering.
- Under adaptive maintenance software is modified to accommodate changes in its hardware and software environments as well as to changes in requirements

4. The software project plan encompasses all the information that software project managers need for managing software projects.
   a) State the main parameters for producing the project plan. [2.5 marks]

b) Briefly describe the main phases of the planning process in Software Engineering. [5 marks]

Answer (Study Guide Chapt 4)

Main parameters for producing the project plan:-

- The project objectives & scope
- The component tasks into which the whole project is broken down
- The estimated effort, cost and duration
- The scheduling of tasks and milestones taking into account constraints on resources
- Risks involved

Main phases of the planning process are:-

1. Bounding
   - responsible for the characterization of the objectives & scope of the project
2. Decomposition
   - responsible for the characterization of the component tasks into which the whole project is best broken down
3. Planning
   - focus on (1) computing the estimated effort, estimated cost, estimated duration (2) using the above to compose a task schedule with milestones (3) drawing up a risk management plan
4. Tracking & control
   - Responsible for observing the behaviour of parameters over the duration the project and for initiating appropriate actions in response to observations

5. Establishing baseline software data is crucial in software estimation, state the characteristics that baseline data should possess in order to be suitable for use in estimation. [4 marks]

Answer (Pg 37 study guide)

Baseline data must be:

1. Accurate i.e. carefully measured, rather than simply guessed
2. Frequent i.e. measures must be taken often and systematically, rather than erratically
3. Consistent i.e. measurement procedures must exist and be adhered to
4. Appropriate i.e. measurements should be qualified by the kind of software project they originate from

6. Briefly explain the 5 stages of software risk analysis. [10 marks]

Answer (Chapt 4 study guide)

1. Risk Identification
   - A systematic attempt to specify threats to the project plan (estimates, schedule, resource loading, etc).
   - By identifying known & predictable risks, the project manager takes a first step toward avoiding them when possible & controlling them when necessary
2. Risk Characterization
   - After risk is identified, they must be characterized. Risk analyst needs to understand better the nature and the relevance of each risk
   - An example of risk category in the context of SE is (1) Business risk (2) Project risk (3) Technical risk
3. Risk Quantification (pg 50)
   - Requires rating each identified & characterized risk using two scales – (1) likelihood of occurrence (2) impact of occurrence
   - Involves several steps including defining likelihood of risks, defining impact of risk and assigning priority of risk
4. Risk Assessment (pg 51)
   - To assess whether the risk levels are acceptable.
   - Determine break factors (e.g. schedule slippage, cost overrun) and break levels to reach a go/no-go decision
5. Risk Aversion Plan
   - Before the project starts, act to mitigate causes; from the start, assume that the risk will materialize, act to avert it and monitor the result of such actions

7. Explain the requirements engineering process. [6 marks]

Answer (Lecture 4)

- Elicitation — determining what the customer requires
- Analysis & negotiation — understanding the relationships among various customer requirements and shaping those relationships to achieve a successful result
- Requirements specification — building a tangible model of requirements
- System Modeling — building a representation of requirements that can be assessed for correctness, completeness, and consistency
- Validation — reviewing the model
- Management — identify, control and track requirements and the changes that will be made to them; when the system is complex, traceability tables can be used to determine the co-relations among requirements

8. Describe the facilitated application specification technique (FAST). What is it used for? [3 marks]

Answer (Section11.2):

Brainstorming meeting, whose goal is to identify the problem, propose elements of a solution, negotiate different approaches, and specify a preliminary set of solution requirements. Meeting is held (ideally) at a neutral site, attended by customers and software engineers. Product request is distributed prior to the meeting. Each attendee is to make a list of potential objects, their services, constraints and performance criteria from his or her own perspective. At the meeting the lists will be presented, voting and/or discussion determine the priority of each item, and a combined list is produced.

9. What models are created during the analysis phase of a software development process? What is the purpose of each? [5 marks]

Answer (Section 11.3):

1. Data model - shows relationships among data objects in the system
2. Functional model - describes the functions enabling the transformations of system objects
3. Behavioral model - shows manner that software responds to events initiated from the outside world

10. Explain how effective modular design is achieved through functional independence of the individual modules? [5 marks]

Answer (Section 13.5):

Functional independence of modules is achieved by making modules single-minded (high cohesion) and preventing excessive interaction (low coupling) with other modules or system elements. Independent modules are easier to develop, maintain, and test, because the impact of side effects is reduced (as is the propagation of errors). This also makes it easier to perform parallel implementation of modules.

11. List the four design models required for a complete specification of a design and explain how each is created. [8 marks]

Answer (Section 13.1):

1. Data design - created by transforming the ERD and data dictionary into data structures required for software implementation

2. Architecture design - derived from the system specification and the subsystem interactions defined in the DFD

3. Interface design - derived from the DFD and CFD by focusing on how the software elements (humans and systems) interact

4. Component-level design - structural elements defined in the PSPEC, CSPEC, and STD are transformed into procedural descriptions of the software components