EE4001/IM2001 Software Engineering -Tutorial 1 and Sample Answer

1) Verify the correctness of the following sentences and give your answers in the form “true” and “false”:
   a) Abstraction is a fundamental problem solving activity that focuses on essential aspects and ignore unessential aspects of a problem.
   b) Modeling allows us to develop a machine independent solution (a logical model) through focusing on the important aspects of a problem before programming starts.
   c) A logical model excludes all the physical characteristics (e.g., details that are only specific to implementation) of a problem and its solution.
   d) Mathematics can be used in modeling.
   e) Modeling uses concepts and notations that have precise meaning.
   f) An algorithm operating on its required data structure forms a logical model for a computer program.

Q1 Answer

a) True.
b) True.
c) True.
d) True.
e) True
f) True

2) Discuss the key difference between: (a) software development and hardware manufacturing; (b) software maintenance and hardware maintenance.

Q2 Answer

(a) The key difference between software development and hardware manufacturing:

In software development, we do not produce the same product again and again based on the same process and design, but we do this in hardware manufacturing. In hardware manufacturing, for producing an identical copy of the product, we need to run the same process based on the same design. As such, we produce the same product again and again based on the same design and process. For software, for producing an identical product, we just need to make another copy. When we carry out a software development, it is surely for different requirement and/or different design.

(b) The key difference between software maintenance and hardware maintenance:

Component replacement is the main activity in hardware maintenance. However, as software does not wear out, there is no clear cut timing to phase out a piece of software. As a result, users are likely to pressurize software engineers to incorporate more and more new requirements after a system is implemented. Hence, making changes for bug rectification or new requirements is the main activity in software maintenance.

3) Identify a suitable prescriptive process model for developing software under each of the following situations:

a) A moderate size system with well-defined requirements and sufficient manpower to develop.
b) A large system with well-defined requirements and insufficient manpower to develop.
c) The users themselves are not sure about their requirements of a system.
d) A small system that requires intensive user interaction and the users are not sure about their requirements.
e) A large, complex and high-risk system and the users are not sure about their requirements.
f) A system to implement a solution that will be developed by a research project.

Q3 Answer

a) Waterfall Model.
b) Incremental Model.
c) Evolutionary Model.
d) Prototyping Model.
e) Spiral Model.
f) Spiral Model.

4) List the key criteria for deciding the appropriateness of the four prescriptive software process models.

Q4 Answer

The key criteria for deciding the appropriateness of basic software process model:

a) Waterfall model:

i) Well-defined requirements
ii) Sufficient experience
iii) Sufficient resources
iv) Small to moderate size
v) The whole system can be delivered together (No critical requirements that must be delivered/served as soon as possible.)

b) Incremental model:

i) Well-defined requirements
ii) Sufficient experience
iii) Insufficient resources (e.g., project team do not have sufficient manpower)
v) Some critical requirements must be delivered/served as soon as possible.

c) Prototyping:

i) Unclear requirements
ii) Intensive user-system interactions
iii) Little experience
ii) Small systems

d) Spiral model:

i) Large-scale systems
ii) Complex requirements
iii) High-risk
iv) Insufficient experience

5) Identify the most suitable concept from the four basic concepts, entity type, relationship type, instance of entity type and instance of relationship type, in Entity-Relationship (ER) modeling to model each following item:

a) The structure of student information.
b) The information of the supplier IBM.
c) Dr CK Lee teaches OO Programming.
d) Doctor treats Patient.
e) Subject.

Q5 Answer:

a) The structure of student information.
Ans: Entity type.

b) The information of the supplier IBM.
Ans: Instance of entity type.

c) Dr CK Lee teaches OO Programming.
Ans: Instance of relationship type

d) Doctor treats Patient.
Ans: Relationship type

e) Subject.
Ans: Entity type