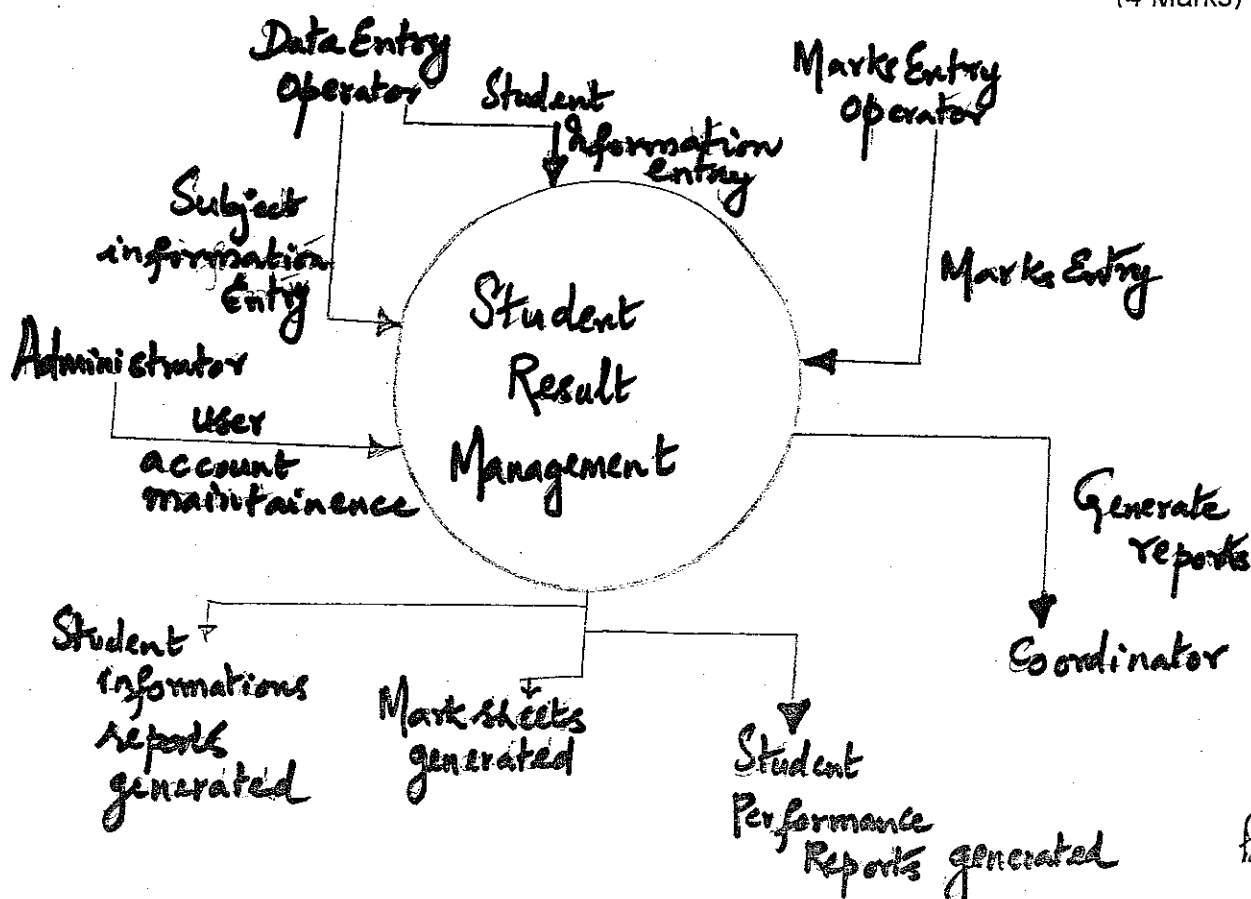


**BITS PILANI, DUBAI**  
**DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI**  
**I SEMESTER 2010-11**

Course	:	<b>BITS C 461 SOFTWARE ENGINEERING (ELECTIVE)</b>
Year / Branch	:	<b>IV Year / CS</b>
Component	:	<b>Comprehensive Examination</b>
Date	:	<b>26-12-2010</b>
Duration	:	<b>3 Hrs</b>
Weightage (%)	:	<b>40 % (40 Marks)</b>
No. of Pages	:	<b>4 Pages</b>

1. Explain the Spiral model of Software Development. What are the limitations of such a model? (4 Marks)
2. Select the process model based on characteristics of requirements and the requirements are as follows: (4 Marks)
  - a) Are requirements easily understandable and defined?
  - b) Do we change requirements quite often?
  - c) Can we define requirements early in the cycle?
  - d) Requirements are indicating a complex system to be built?Tabulate your result based the following process model: Waterfall, prototype, incremental model, spiral model, RAD model. Justify your answer in the remarks column of the table.
3. What do you mean by Quality Function Deployment? (2 Marks)
4. Draw the DFD level-1 diagram for the context level diagram given below: (4 Marks)



5. Consider a database application project with the following characteristics:

- (i) The application has 5 screens with 5 views each and 8 data tables for 5 servers and 8 clients.
- (ii) The application may generate two reports of 6 sections each from 8 data tables for 3 servers and 5 clients. There is 30% reuse of object points.

The developer's experience and capability in the similar environment is medium. The maturity of organization in terms of capability is also medium. Calculate the object point count, new object points and effort to develop such a project.

(5 Marks)

Table for Screens:

Number of Views contained	# and sources of data tables		
	Total <4 ( <2 server < 3 client)	Total < 8 (2-3 Server 3- 5 client)	Total 8+ (> 3 server, 5 client)
< 3	Simple	Simple	Medium
3 - 7	Simple	Medium	Difficult
> 8	Medium	Difficult	Difficult

Table for reports:

Number of sections contained	# and sources of data tables		
	Total <4 ( <2 server < 3 client)	Total < 8 (2-3 Server 3- 5 client)	Total 8+ (> 3 server, 5 client)
0 or 1	Simple	Simple	Medium
2 or 3	Simple	Medium	Difficult
4 +	Medium	Difficult	Difficult

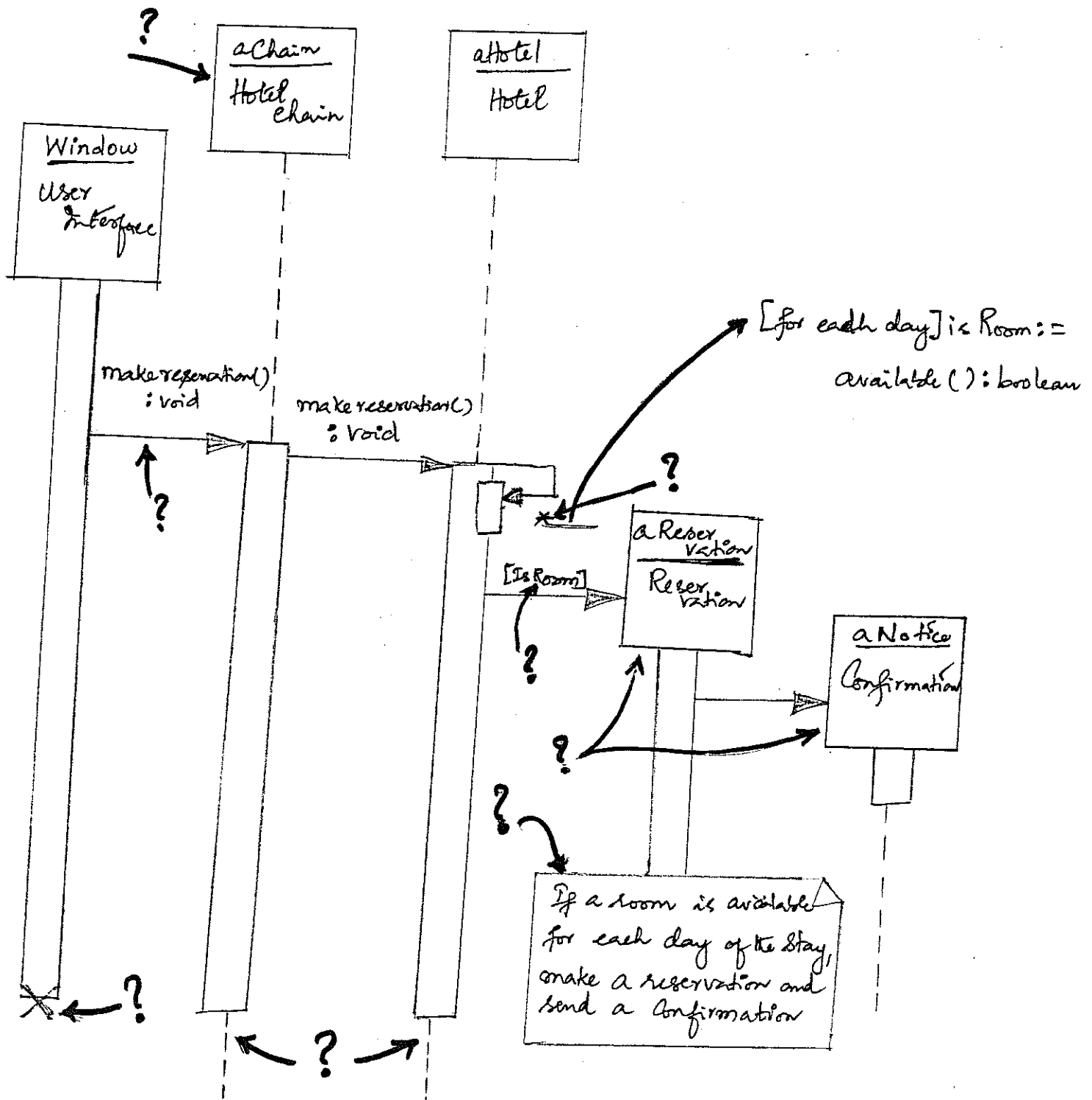
*Table for Complexity weights for each level:*

Object type	Complexity weight		
	Simple	Medium	Difficult
Screen	1	2	3
Report	2	5	8
#GL Component	-	-	10

*Table for Productivity values:*

Developer's experience & Capability Maturity & capability	PROD ( NOP / PM)
Very low	4
Low	7
Nominal	13
High	25
Very High	50

6. What do you mean by McCall Software Quality Model? What are the quality factors considered in the model and group them into three product quality factors? (2 Marks)
7. What do you mean by dynamic white box testing and static white box testing? (2 Marks)
8. Who are all the people involved in the beta testing and alpha testing? What do you mean by beta version of a software product? (3 Marks)
9. Justify your answer for the following definition "Testing is defined as verification + validation". (2 Marks)
10. What are the guidelines that help a Software Engineer for creating Use Cases? What do you mean by Use case template, give one simple Use case template as an example? (4 Marks)
11. Identify what is the type of diagram given below & label them and also convert it to a collaboration diagram? (5 Marks)



12. Give the activity diagram for the statement given below: "Withdraw money from a Bank Account through an ATM". (3 Marks)

**BITS, Pilani-Dubai**  
**Dubai International Academic City, Dubai**  
**I – Semester 2010-11**

Course : **BITS C461 Software Engineering (Elective)**  
Year : **IV Year CS**  
Component : **Test – 2 (Open Book)**  
Weightage (%) : **20 % (20 Marks)**  
Date : **21-11-2010**  
Duration : **50 mins**  
No. of Pages : **2 Pages**

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**Note: Text Books and Class notes are allowed.**  
**Answer all the questions.**

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1. Give your architectural style of design for the following application and justify why you had selected this style for this application. ( 4 Marks )

A mobile robotics system is one that controls a manned or partially manned vehicle, such as a car, a submarine, or a space vehicle. Such systems are finding many new uses in area such as space exploration, hazardous waste disposals and underwater exploration. Building the software to control mobile robots is a challenging problem. This system must deal with external sensors and actuators, and they must respond in real time at rates commensurate with the activities of the system in its environment. In particular, the software function of a mobile robot typically include acquiring input provided by its sensors, controlling the motion of its wheels and other movable parts, and planning its future path. Several factors complicate the tasks: obstacles may block the robot's path; the sensor input may be imperfect; the robot may run out of power; mechanical limitations may restrict the accuracy with which it moves; the robot may manipulate hazardous materials; and unpredictable events may demand a rapid response.

2. What are the strengths and weaknesses of Pipe and Filter Architectural Style? (3 Marks)
3. Mention the ten general principles for User Interface Design? (2 Marks)

4. Calculate the Estimate Effort, if the object points is 49; the percentage of reuse of the source code is 35%; the number of people required is 25 and the development time 180 days. (4 Marks)
5. Give a Gantt chart that represent the development of the database core component design which is used to retrieve the information that located in a distributed computing environment. The core component help the client to check for the correctness of the query with the help of the Execution Manager component which is the sub component of the database handler component, the query is submitted to exact database server with the help the sub-component of the Site handler Component, like site identifier, site manager, schema manager; finally the query is divided into sub-queries and submitted to the corresponding database server. After processing the query at the corresponding database server the result is given back to client through the database core component. (3 Marks)
6. Let us assume that the average cost to correct a defect during code generation is approximately AED 60 per error. And the average cost to correct the same error if it is discovered during system testing is AED 135 per error. The cost of fixing the errors during the maintenance phase is double the cost of testing. Consider a telecommunication application that has 275 errors, What will be the cost of to fix the 275 errors:
- (i) If all the 275 errors are fixed during the code generation phase.
  - (ii) if 50% of errors are fixed during the system testing and remaining 50% are fixed during the maintenance phase, what will be the total cost.

(1+ 3 Marks)

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**BITS, PILANI-DUBAI**  
**DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI**  
**I-SEMESTER 2010-11**

Course No. : **BITS C461**  
Course Name : **Software Engineering (Elective)**  
Year : **IV Year Computer Science**  
Component : **Test – 1**  
Nature of Component : **Closed Book**  
Date : **10-10-2010 Sunday**  
Weightage : **25 % ( 25 Marks)**

No. Of Pages: <b>2</b>
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Note: Answer all questions and answer must be more specific to the problem statements.

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1. What are the advantages of developing the prototype of software? ( 3 Marks )
2. Give the 0-Level DFD or Context diagram for Student result management system. The following persons are interacting with the “Student result management system”: Administrator, marks entry operator, Data entry operator, coordinator. The system also generates report like result, student information, student performance reports etc.? (2 Marks )
3. A university wishes to develop a software system for library management activities. Design the problem statement for the software company. ( 5 Marks )
4. Give the Use Case diagram for Automated Railway Reservation System and the problem of statement of Railway Reservation System is follows: (8 Marks )

Software has to be developed for automating the manual railway reservation system. It should be designed to provide functionalities as explained below:

- a) **Reserve Seat:** A passenger should be able to reserve seats in the train with human intervention the reservation process has to be done.
- b) **Cancel Reservation:** A passenger wishing to cancel a reservation is required to fill a form. The passenger then submits the form and the ticket to the clerk / people associated to that activity. He / She delete the entries in the system and change the reservation status.
- c) **Update Train Information:** Only the administrator enters changes related to the train information like change in the train name, train number, train route etc, in the system.

- d) **Report Generation:** Provision for generation of different reports should be given in the system.
  - e) **Login:** For security reasons all the user of the system are given a user id and a password. Only if the id and password are correct the user is allowed to enter the system.
  - f) **View Reservation Status:** rights for the user to view the reservation status online by entering the train number and the pin number printed on the ticket, so that the system will display his / her current reservation status like confirmed or wait list.
  - g) **View Train Schedule:** Provision should be given to see the information related to the train schedules for the entire train network. It shows the train number, train name, boarding and destination stations, duration of journey etc.
5. What are the outcomes of Elaboration phase? (3 Marks )
6. Give a table that shows the selection of a process model based on characteristics of requirements. The requirements are as follows: ( 4 Marks )
- a) Are requirements easily understandable and defined?
  - b) Do we change requirements quite often?
  - c) Can we define requirements early in the cycle?
  - d) Requirements are indicating a complex system to be built?

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BITS, Pilani, Dubai  
Dubai International Academic City, Dubai  
I Semester 2010-11

**Quiz – 2**      **Max. Marks: 7 Marks**      **Date: 13-12-2010**      **Duration: 20 mins**  
**Course**      **: BITS C461 Software Engineering (Elective – IV Year CS)**

**Name:** \_\_\_\_\_ **Id.No. :** \_\_\_\_\_

Qns.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Ans.														

**Note: Please do not overwrite the answers.**

1. Identify which of the following modeling element is not associated with Activity Diagrams.
  - (a) Association
  - (b) Swimlane
  - (c) Initial node, and final node
  - (d) Fork and join nodes
2. Identify which of the following modeling element is not associated with Use case Diagrams.
  - (a) actors
  - (b) include relationship
  - (c) exclude relationship
  - (d) Aggregate relationship
3. What are the two broad categories of diagrams in UML 2.0?
  - (a) Structural and Use case
  - (b) Behavioral and Logical
  - (c) Structural and Behavioral
  - (d) Logical and Physical
4. Which one of the following is not one of standard stereotype in Deployment Diagram?
  - (a) Artifact
  - (b) Processor
  - (c) Device
  - (d) Execution Environment
5. What are the two different types of statechart / state machine diagram in UML 2.0?
  - (a) Single and Multi Stage state machines
  - (b) Behavioral and Protocol State machines
  - (c) Class and Component State Machines
  - (d) Complex and Simple state machines
6. Which of the following is not a valid type of message arrow in sequence diagram?
  - (a) Synchronous Messages
  - (b) Activation Message
  - (c) Asynchronous Messages
  - (d) Return Message

7. Which of the following relationship is not part of package diagram?
  - (a) Merge
  - (b) Export
  - (c) Import
  - (d) Access
8. A class diagram can be used to model following things except?
  - (a) Depicting the implementation detail of domain entities.
  - (b) Depicting the interaction between domain entities
  - (c) Depicting state and behavior of the domain entity
  - (d) Depicting domain entities and relationship between them.
9. Which of the following is not valid in the context of Component Diagrams?
  - (a) initial node, final node
  - (b) ports and connectors
  - (c) Black-box and White-box view
  - (d) provided and required interfaces
10. UML depicts information systems as a collection of:
  - (a) data
  - (b) entities
  - (c) information
  - (d) objects
11. Which one of the following highlights the roles each object plays in an interaction model?
  - (a) Sequence Diagrams
  - (b) Collaboration Diagrams
  - (c) Deployment Diagrams
  - (d) Packages Diagrams
12. Which is true about the Activity diagrams?
  - (a) shows behavior with control structure
  - (b) can show many objects over many uses
  - (c) can show many objects in a single use case or implementation of method
  - (d) encourages parallel behavior
  - (e) All of the Above
13. Which of the following are valuable for concurrent processes?
  - (a) Activity Diagrams
  - (b) Package diagrams
  - (c) State Diagrams
  - (d) Class Diagrams
  - (e) Sequence Diagrams
14. Which of the following statements are false about the following Traceability through life cycle diagram? Business Use Case -> System Use Case -> Flow of Events -> Sequence/Collaboration Diagram -> Class Diagram -> Component Diagram -> Code
  - (a) Each of the system use cases should be able to be traced back to a business use case.
  - (b) The mapping between Business Use Cases and System Use Cases is one-to-one.
  - (c) Not all business use cases will be supported by system use cases.
  - (d) Each functional requirement MUST be traced to a system use case

\*\*\*\*\*All the Best\*\*\*\*\*

**BITS, Pilani-Dubai**  
**Dubai International Academic City, Dubai**  
**I-Semester 2010-11**

**Course : BITS C461 Software Engineering (Elective)**

**Date: 01-11-2010**

**Component : Quiz – 1**

**Marks : 8 Marks**

**Name : \_\_\_\_\_**

**Id. No. : \_\_\_\_\_**



**Write the answers in the tabulation given below:**

Qns. No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Ans.																

1. Which of the following is not of Software Architecture?
  - a) Algorithm details,
  - b) databases
  - c) Data Design
  - d) Program structure
2. Data Design actually begins during the creation of the analysis model, not the architectural model?
  - a) True
  - b) False
3. An architecture style encompasses which of the following elements?
  - a) Constraints
  - b) set of components
  - c) Semantic models
  - d) all of the above
4. In the architecture tradeoff analysis method the architecture style should be described using the
  - a) Data flow view
  - b) module view
  - c) Process view
  - d) all of the above
5. Which of the following is not an objective for building an analysis model?
  - a) Define set of software requirements
  - b) describe customer requirements
  - c) Develop an abbreviated solution for the problem
  - d) Establish basis for software design
6. The data flow diagram
  - a) depicts relationship between data objects
  - b) depicts functions that transforms the data flow
  - c) specified major logical decision as they occur
  - d) Indicates system reactions to external events
7. The data model consists of three pieces of interrelated information
  - a) Attributes
  - b) data objects
  - c) Relationships
  - d) all of the above

8. The rules for the Interface design:
- a) Make the interface concurrent and inconsistent
  - b) Reduce the user's control of the memory
  - c) Place the user in control
  - d) All of the above
9. Mandel defines a number of design principles that allow the user to maintain control:
- a) Define interaction modes in a way that force a user into unnecessary or undesired actions.
  - b) Design for direct interaction with objects that appear on the screen
  - c) Allow user interaction to be uninterruptible and doable.
  - d) Hide technical internals from all users.
10. The design principles that help to make the interface consistent:
- a) allow the user to put the current task into a meaningful context
  - b) maintain consistency across a family of applications
  - c) Do not change the past interactive model unless there is a compelling reason.
  - d) All of the above
11. The end user develops a mental image that is often called the user's
- a) User model                      b) design model
  - c) Mental model                  d) implementation model
12. If the analysis and design process for user interfaces is iterative, it can be represented using
- a) cyclic model                  b) spiral model
  - c) System model                d) all of the above
13. The goal of interface design is to define
- a) set of interface objects and actions    b) set of methods and objects
  - c) Both                              d) none of the above
14. Interface validation focus on
- a) the degree to which the interface is easy to use and easy to learn
  - b) The user is denying to accept the interface a useful tool
  - c) The ability of the interface to implement every user task correctly to accommodate all task variations.
  - d) (a) and (c)
15. The taxonomy of architectural styles are
- a) data-centered architecture              b) data flow architecture
  - c) Call and return architectures          d) all of the above
16. An architectural mapping technique is called
- a) Unstructured design                      b) structure design
  - c) Both (a) and (b)                        d) none of the above