# King Saud University

**College of Computer and Information Sciences**
**Computer Science Department**

| | |
|---|---|
| Course Code: | **CSC 342** |
| Course Title: | **Software Engineering** |
| Semester: | **Spring 2018** |
| Exercises Cover Sheet: | **MID2 Exam** |  **90 Minutes** |

| | mark |
|---|---|
| Q1 | 7 |
| Q2 | 5 |
| Q3 | 4 |
| Q4 | 4 |
| Total | 20 |

Student Name: ...............................................................

Student ID: ...............................................................

Department Name: ...............................................................

| Tick the Relevant | Computer Science B.Sc. Program ABET Student Outcomes | NCAAA Outcomes | Question No. Relevant Is Hyperlinked | Covering % |
|---|---|---|---|---|
| | a) **Apply knowledge of computing and mathematics appropriate to the discipline;** | 1.1 | | |
| √ | b) **Analyze a problem, and identify and define the computing requirements appropriate to its solution** | 2.1 | *Q1* | |
| √ | c) **Design, implement and evaluate a computer-based system, process, component, or program to meet desired needs;** | 2.2 | *Q2* | |
| √ | d) **Function effectively on teams to accomplish a common goal;** | 3.1 | | |
| √ | e) **Understanding of professional, ethical, legal, security, and social issues and responsibilities;** | 1.2 | | |
| | f) **Communicate effectively with a range of audiences;** | 4.1 | | |
| | g) **Analyze the local and global impact of computing on individuals, organizations and society;** | 2.3 | | |
| | h) **Recognition of the need for, and an ability to engage in, continuing professional development;** | 2.4 | | |
| √ | i) **Use current techniques, skills, and tools necessary for computing practices.** | 1.3 | Q3 | |
| | j) **Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;** | 1.4 | | |
| √ | k) **Apply design and development principles in the construction of software systems of varying complexity;** | 1.5 | Q4 | |
| √ | **General Question** | ----- | | |

## Question #1:  [         / 7 Points ]

**Circle the most appropriate answer (You should select one answer ONLY)**

1. An advised architecture style for a military software system would be:
    a)  shared data repository.
    b)  client-server.
    c)  layered architecture.
    d)  none of the above.

2. High coupling makes modifying parts of the system:
    a)  difficult.
    b)  easy.
    c)  more efficient.
    d)  no effect.

3. Verification is about:
    a)  are we testing the right product.
    b)  are we testing the product right.
    c)  are we building the product right.
    d)  are we building the right product.

4. On top-down integration testing we replace real implementations of each component with:
    a)  stubs.
    b)  module.
    c)  class.
    d)  none of the above.

5. The testing in which code is checked:
    a) Black box testing
    b) White box testing
    c) Red box testing
    d) Green box testing

6. Unit testing is done by
    a) Users
    b) Developers
    c) Customers
    d) None of the mentioned

7. Which granularity level of testing checks the behavior of module cooperation?
   a) Unit Testing
   b) Integration Testing
   c) Acceptance Testing
   d) Regression Testing

8. When does the testing process stops?
   a) When resources (time and budget) are over
   b) When some coverage is reached
   c) When quality criterion is reached
   d) Testing never ends

9. A diagonal line in a sequence diagram
   a) represents the lifetime of an object.
   b) means that the message is received with some delays at the other side.
   c) means this object has a longer life time
   d) represents an object that is created later than the other objects.

10. An advised if you are building a system that would needs more frequent maintenance:
   a) Use layered architecture
   b) Isolate safety critical component
   c) Include redundant components
   d) Use fine-grain self-contained components

11. Among the main disadvantages of the shared data repository model is
   a) Centralized backup, access control, and error recovery
   b) Redundant management in each component
   c) Components need to know the interface of the other components
   d) Same policy forced on all sub-systems

12. Cohesion is about
   a) The degree to which all responsibilities of a single component are related
   b) The degree to which physical system component are connected
   c) The control structure between component.
   d) The control structure between sub-systems.

13. In call-return model
    a) control starts at the top of the hierarchy and passes to lower level processes via interrupts.
    b) control starts at the top of the hierarchy and passes to lower level processes via function calls.
    c) control starts at the bottom of the hierarchy and passes to top level processes via function calls.
    d) control starts at all levels at the same time.

14. Allows fast response but complex to program:
    a) layered architecture
    b) client-server architecture
    c) centralized architecture
    d) Interrupt-driven systems

# Question #2:   [          / 5 Points ]

1. Draw a sequence diagram to illustrate the interactions during "Make appointment" scenario by Easy Hospital System. [          / 3 Points ]

In Easy Hospital System the scenario of the Make Appointment use case is as follows: A patient asks the receptionist to make an appointment with a certain doctor. Then the receptionist searches the patient's record to insure that he paid all of the previous bills. If not, the appointment request is declined until all pills are paid. Otherwise, if all bills were already paid, the receptionist would ask the client about his preferred date and time. If the doctor is available during the requested period, the appointment will be confirmed, otherwise, the process will be repeated until an appointment is scheduled.
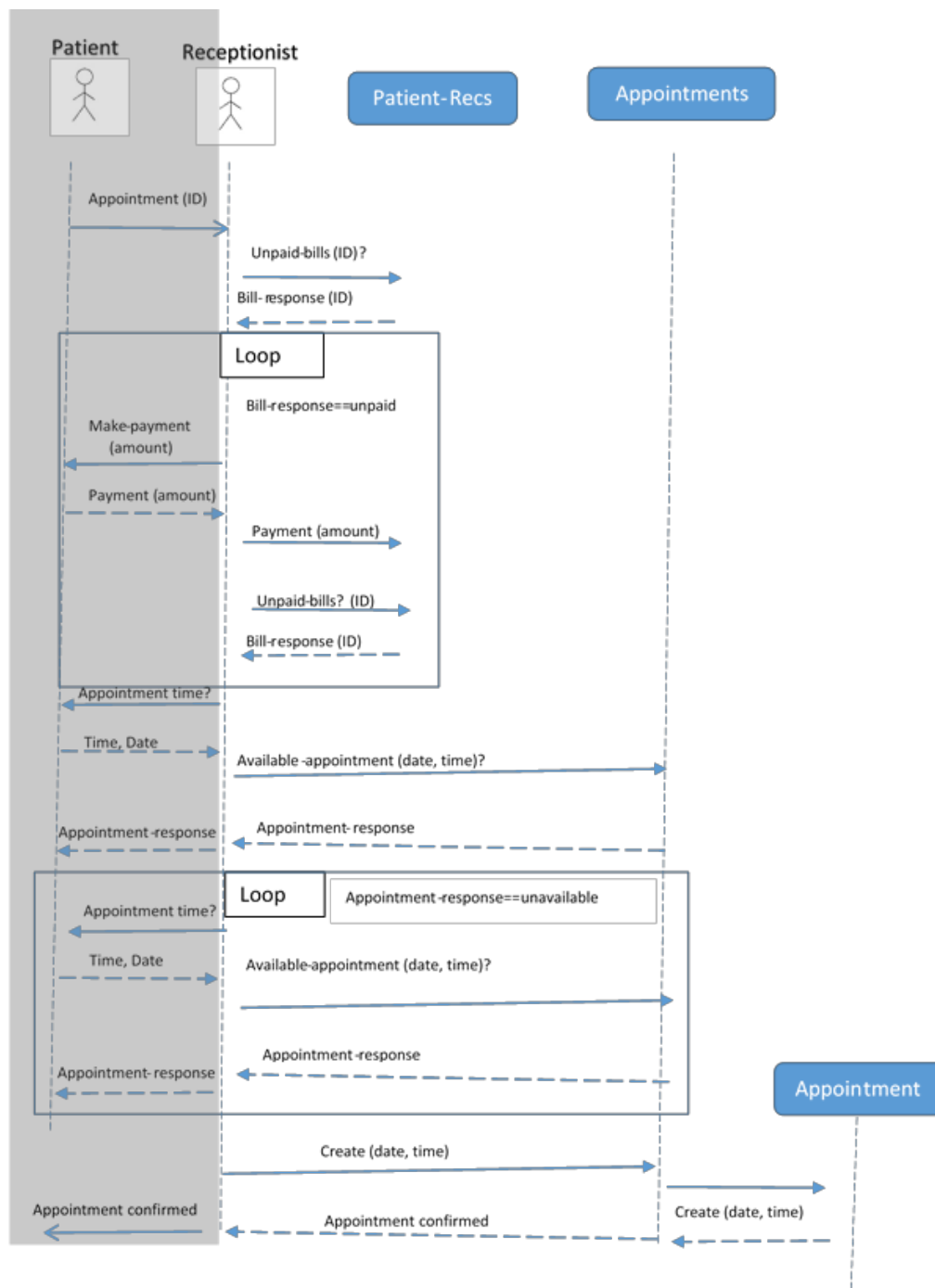
**2. Draw a collaboration diagram to illustrate the interaction during "Make appointment" scenario by Easy Hospital system.**
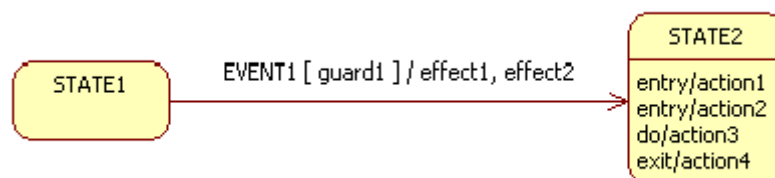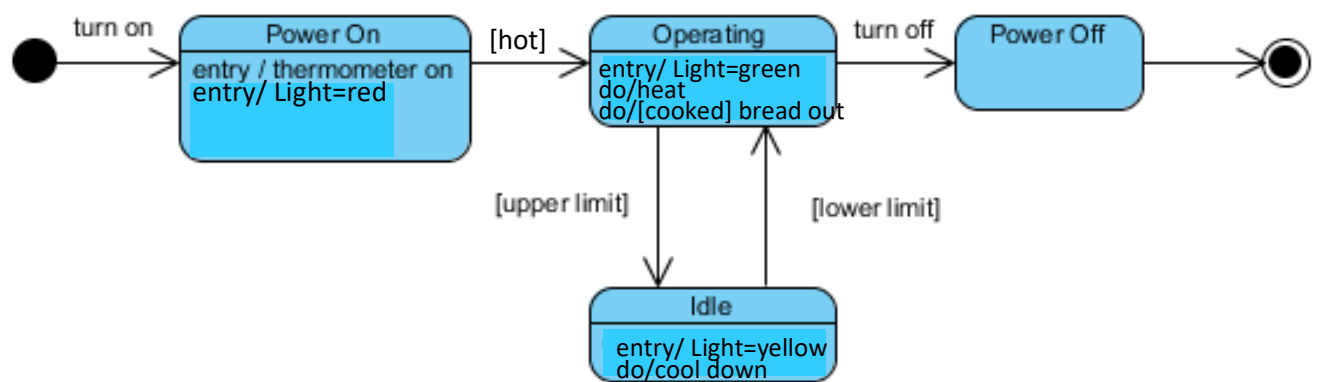**[          / 2 Points ]**

**Should be based on the sequence diagram drawn by the student.**

# Question #3:   [          /  4 Points ]

**Draw a state diagram for the toaster described below:**

First of all the person needs to turn on the toaster (its indicator light becomes red), and wait for a few seconds until it becomes hot (its light turns to green). Then, he needs to put in the bread and wait for several minutes to bake it. To prevent burning out the bread, heater of the toaster must produce heat in temperature interval (upper and lower temperature limits). For this purpose thermometer measures the temperature of heater, and when the upper limit of temperature is reached then heater must go into idle state (the indicator light becomes yellow). This state persists until heater's temperature decreases to lower limit, and then working state is again aimed. When the toaster in no longer needed, it is turned off.

## Question #4: [        / 4 Points ]

The following directed graph models the control flow of program A:
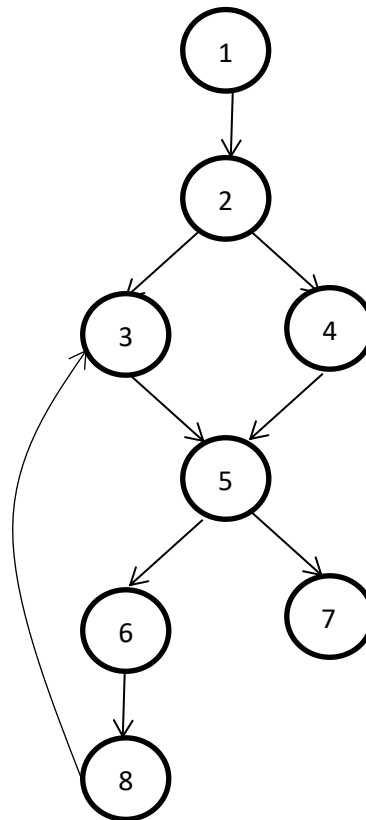


a. **Determine the number of tests needed to test all control statements of program A. [        / 1 Point ]**
CC = number of edges – number of nodes + 2
CC = 9– 8+ 2
   = 3

b. **What are the main paths that should be considered while testing program A.**
[        / 1 Points ]
Path 1: 1,2,4,5, 7
Path 2: 1,2,3,5, 7
Path 3: 1,2,3,5, 6,8,3,5,7

c. **Name the approach that can be used to design test cases based on the above information. [        / 1 Point ]**
Path testing

d. **What is the main objective of this testing approach? [        / 1 Points ]**
The objective of path testing is to ensure that the set of test cases is such that each path through the program is executed at least once.

| Result | | | | | | |
|---|---|---|---|---|---|---|
| Question No. | Relevant ABET Student Outcome | Relevant NCAAA Student Outcome | SO is Covered by % | Full Mark | Student Mark | Assessor's Feedback |
| Q 1 | b | 2.1 | 35 | 7 | | |
| Q 2 | c | 2.2 | 25 | 5 | | |
| Q 3 | i | 1.3 | 20 | 4 | | |
| Q 4 | k | 1.5 | 20 | 4 | | |
| Totals | | | 100% | 20 | | |
| | I certify that the work contained within this assignment is all my own work and referenced where required.  Student Signature:          Date: | | | | | Feedback Received:   Student Signature: Date: |