Course No: SWE 5441 **Course Title: SW Modeling.** **Date: 20/ 05 / 2015** **No. of Questions: ____4___** **Time: 2 H.** **Using Calculator (Yes)**	**University of Palestine** UP **Final Exam** **Second Term 2014/2015** **Total Grade: 60**	**Instructor Name: Eng. M. Timraz** **Student No.: _____** **Student Name: _____** **College Name: Engineering** **Dep. / Specialist: Software** **Using Dictionary (No)**

Q1: Choose the correct answer (a, b, c or d)   (20/60)

1. How is a class depicted on a class diagram?
(a) A box with one compartment
(b) A box with one or two compartments
(c) A box with one, two, or three compartments
(d) An oval

2. What are the two kinds of UML interaction diagrams?
(a) Class diagram and sequence diagram
(b) Sequence diagram and communication diagram
(c) Class diagram and communication diagram
(d) Statechart and communication diagram

3. What does an interaction diagram depict?
(a) Objects and links
(b) Classes and relationships
(c) Objects and messages
(d) States and events

4. What is carried out during design modeling?
(a) Developing use case models
(b) Developing data flow and entity relationship diagrams
(c) Developing static and dynamic models
(d) Developing software architectures

5. What is an alternative sequence in a use case?
(a) A sequence that describes an error case
(b) A sequence that is different from the main sequence
(c) A sequence that describes interactions with a secondary actor
(d) A sequence that describes interactions with a primary actor

6. What can an inclusion use case be used for?
(a) To describe an inclusive use case
(b) To describe a lengthy interaction with an actor
(c) To describe functionality that is common to more than one use case
(d) To describe a use case that includes other use cases

7. What can an extension use case be used for?
(a) To describe a lengthy interaction with an actor
(b) To describe functionality that is common to more than one use case
(c) To describe the functionality of a use case that is extended by another use case(s)
(d) To describe a conditional part of a different use case that is only executed under certain circumstances

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8. What can an activity diagram be used for in use case modeling?
(a) To depict the sequence of activities executed by all the use cases in the system
(b) To depict the sequence of external activities that the use case interacts with
(c) To depict the sequence of active objects in a use case
(d) To depict the activities in the main and alternative sequences of a use case

9. What is a use case package?
(a) A package describing the actors in the system
(b) A package describing the use cases in the system
(c) A group of related use cases
(d) The package of objects that participate in the use case

10. What is an association?
(a) A relationship between two classes
(b) A relationship between two objects
(c) A link between two classes
(d) A link between two objects

11. What is meant by the multiplicity of an association?
(a) The number of associations in a class
(b) The number of associations between two classes
(c) How many instances of one class relate to how many instances of another class
(d) How many instances of one class relate to a single instance of another class.

12. What is an association class?
(a) A class with multiple associations
(b) A class with one association
(c) A class that models an association between two or more classes
(d) A class that models an association between two or more objects

13. What is a composition hierarchy?
(a) A weak form of a generalization/specialization hierarchy
(b) A strong form of a generalization/specialization hierarchy
(c) A weak form of a whole/part relationship
(d) A strong form of a whole/part relationship

14. What is an entity class?
(a) A class on an entity/relationship diagram
(b) A class that stores data
(c) A class that interfaces to an external entity
(d) An external class

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15. What is a state-dependent control object?
(a) An object that depends on a state machine
(b) An object that communicates with a state machine
(c) An object that controls a state machine
(d) An object that executes a state machine

16. What is a timer object?
(a) An external clock
(b) An internal clock
(c) An object that is awakened by an external timer
(d) An object that interacts with a clock

17. What is the instance form of an interaction diagram?
(a) Depicts several object instances interacting with each other
(b) Depicts one possible sequence of interactions among object instances
(c) Depicts all possible interactions among object instances
(d) Depicts all object instances and their links to each other

18. Which of the following interactions could happen on an interaction diagram?
(a) An external user sends a message to a user interaction object.
(b) An external user sends a message to an entity object.
(c) An external user sends a message to an I/O object.
(d) An external user sends a message to a printer object.

19. Which of the following interactions is NOT likely to happen on an interaction diagram?
(a) A user interaction object sends a message to an entity object.
(b) An input object sends a message to a state-dependent control object.
(c) An input object sends a message to a printer object.
(d) A user interaction object sends a message to a proxy object.

20. What is the difference between an active object and a passive object?
(a) An active object controls a passive object.
(b) An active object does not have a thread of control; a passive object has a thread of control.
(c) An active object executes in a distributed system; a passive object executes in a centralized system.
(d) An active object has a thread of control; a passive object does not have a thread of control.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

Q2: (15/60)

A) From the following diagram, describe the diagram name and relations, and then draw the object diagram. (5 points).
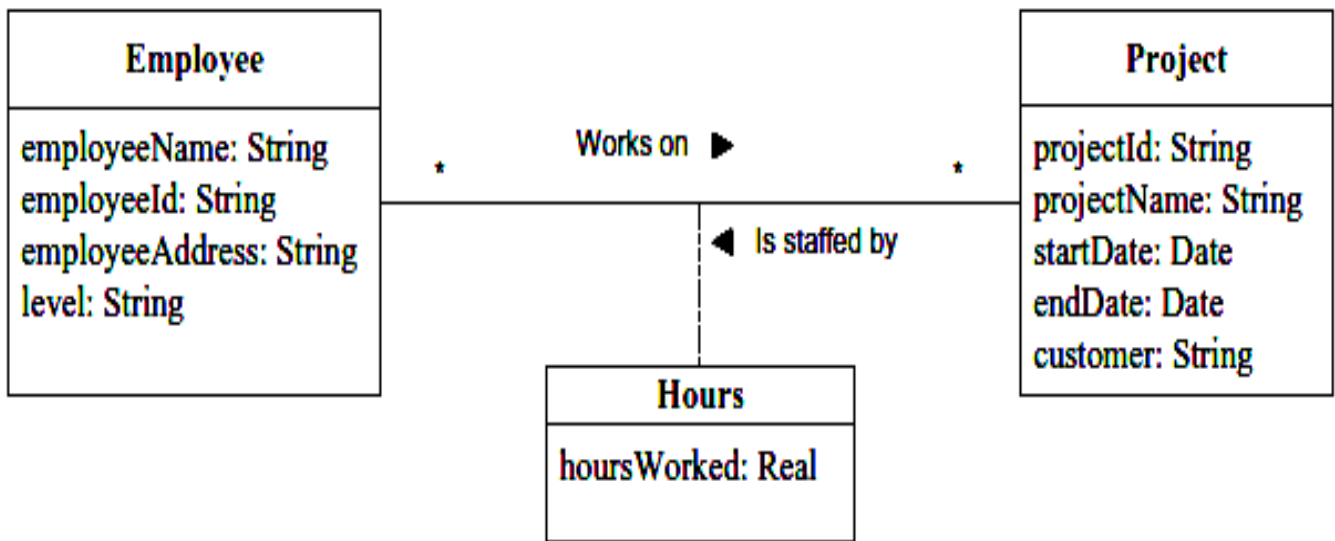
B) According to the following use case diagram draw the class and activity diagrams.
Select one operation "Task", and then draw the sequence diagram for it.
Determine if this system is real time or not with explanation why?   **(10 points).**
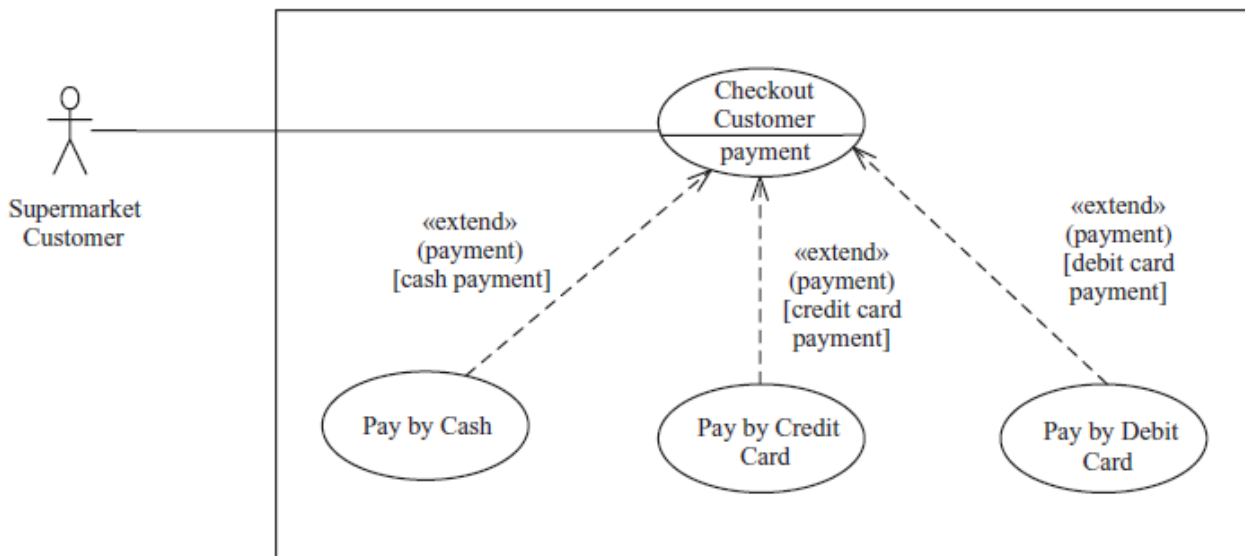
Details:
Use case name: Checkout Customer
Summary: System checks out customer.
Actor: Customer
Precondition: Checkout station is idle, displaying a "Welcome" message.
Main sequence:
1. Customer scans selected item.
2. System displays the item name, price, and cumulative total.
3. Customer repeats steps 1 and 2 for each item being purchased.
4. Customer selects payment.
5. System prompts for payment by cash, credit card, or debit card.
6. «payment»
7. System displays thank-you screen.

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Q3: (10/60)

Design the Use Case Diagram with its description for the following System?

<u>Banking System</u>

Banking system case study is a client /server case study. This is a popular example. A bank has several automated teller machines (ATMs), which are geographically distributed and connected via a wide area network to a central server. Each ATM machine has a card reader, a cash dispenser, a keyboard/display, And a receipt printer by using the ATM machine, a customer can withdraw cash from either a checking or savings account, query the balance of an account, or transfer funds from one account to another. A transaction is initiated when a costumer inserts an ATM car into the dark number, the system validates the ATM card to determine that the expiration date has not passed, that the user entered PIN (personal identification number) matches the PIN maintained by the system, and that the card is not lost or stolen. The customer if the third attempt fails. Cards that have been reported lost or stolen are also confiscated.

If the PIN is validated satisfactorily, the customer is prompted for a withdrawal, query, or transfer transaction. Before a withdrawal transaction can be approved, the system determines that sufficient funds exist in the requested account, that the maximum daily limit will not be exceeded, and that there are sufficient funds at the local cash dispenser. If the transaction is approved, the requested amount of cash is dispensed, a receipt is printed containing information about the transaction, and the card is rejected. Before a transfer action can be approved, the system determines that the customer has at least two accounts and that there are sufficient funds in the account to be debited. For approved query and transfer requests, a receipt is printed and the card ejected. A customer may cancel a transaction at any time; the transaction is terminated and the card is ejected. Customer records, account records and is not part of this problem.

An ATM operator may start up and close down the ATM to replenish the ATM cash dispenser and for routine maintenance. It is assumed that functionality to open and close accounts and to create, update, and delete customer and debit card records is provided by existing system and is not part of this problem.

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Q4: (15/60)

Draw a activity diagram to describe the behavior of a simple microwave oven controller. The events that the controller must react to are as follows:

Name	Description	Effect
Add1Sec	User pressed the button labeled "+1sec" on the oven keypad.	Adds 1 second to the cook time.
Add10Sec	User pressed the button labeled "+10sec" on the oven keypad.	Adds 10 seconds to the cook time.
StartStop	User pressed the "Start/Stop" button on the oven keypad.	Starts cooking if there is a cook time set and the oven is not cooking. If the oven is cooking it pauses the cooking.
Reset	User pressed the "Reset" button on the oven keypad.	Clears the cook time and stops any cooking.
Power	User pressed the "Power Level" button on the oven keypad.	Only effective when a cook time is set and the oven is not cooking. Causes the cook power level to be decreased by 10%.
Tick	Occurs once per second.	
DoorOpen	The oven door is opened.	The oven should not cook with the door open.
DoorClosed	The door is closed.	

The following sequence of events would start the oven cooking for 13 seconds at 80% power, assuming that the door is closed: Add10Sec, Add1Sec, Add1Sec, Add1Sec, Power, Power, Start Stop.

The following outputs are to be controlled:
1. **Cook (pl) Causes the oven to cook at power level pl.**
2. **Stop causes the oven to stop cooking.**

Display (val) Displays the string val on the display.

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Good Luck