Course No: SWE5441 **Course Title: Software Modeling** **Date: 01 / 04 / 2015** **No. of Questions: 3** **Time: 1 hr** **Using Calculator (Yes)**	**University of Palestine**  **Mid -Term Exam** **2nd term 2014/2015** **Total Grade: 20**	**Instructor: Eng. M. Timraz** **Student No.: _____** **Student Name: _____** **College Name: College of Eng.** **Dep. / Specialist:** **Using Dictionary (No)**

First Question **No. of Branches (1)** **(10/20)**

Design the Use Case and class Diagrams with its description for the following?

Factory Automation System

As an example of the design of a distributed application, a Factory Automation System is considered. This is a highly distributed application, with several clients and servers, a real time control component, and examples of client/server communication as well as peer to peer communication.

In a high volume, low flexibility assembly plant, manufacturing workstations are physically laid out in an assembly line. Parts are moved between workstations on a conveyor belt. A part is processed at each workstation in sequence. Because workstations are programmable, variations on a given product can be handled. Typically, a number of parts of the same type are produced, followed by a number of parts of a different type.

Each manufacturing workstation has an assembly robot for assembling the product and a pick and place robot for picking parts off and placing parts on the conveyor. Each robot is equipped with sensors and actuators. Sensors are used for monitoring operating conditions (for example, detecting part arrival), and actuators are used for switching automation equipment on and off (for example, switching the conveyor on and off). The first workstation is the receiving workstation and the last workstation is the shipping workstation. These workstations have only a pick and place robot. All other workstations are referred to as line workstations they have the assembly robot in addition to the pick and place robot. Factory operates view workstation status and alarms.

The manufacturing steps required to manufacture a given part in the factory, from raw material to finished products, are defined in a process plan. The process plan defines the part type and the sequence of manufacturing operations. Each operation is carried out at a workstation. Process engineers create process plans and their constituent operations.

The processing of new parts in the factory is initiated by the creation of a work order by a human production manager. The work order defines the quantity of parts required for a given part type.

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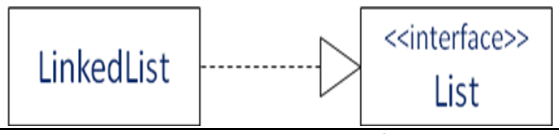
Second Question — No. of Branches (1) — (05/20)

Select the best answer from group A for its suitable from group B.

No.	Group A	Class	Group B	Selection
1.	2..4	A	Specified range	
2.	Is an end of an association where it connects to a class.	B	0..1	
3.	Zero or more (unlimited)	C	1..*	
4.		D	Associations	
5.	A semantic relationship between two or more classes that specifies connections among their instances.	E	Realization	
6.	Zero or one (optional association)	F	Role	
7.	The number of instances of the class, next to which the multiplicity expression appears, that are referenced by a single instance of the class that is at the other end of the association path	G	Dependency	
8.		H	Multiplicity	
9.	Indicates that objects of the specialized class (subclass) are substitutable for objects of the generalized class (super-class).	I	Generalization	
10.	One or more	J	* (0..*)	

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Third Question **No. of Branches (1)** **(05/20)**

Draw a class diagram for a information modeling system for a school.

- School has one or more Departments.
- Department offers one or more Subjects.
- A particular subject will be offered by only one department.
- Department has instructors and instructors can work for one or more departments.
- Student can enroll in up-to 5 subjects in a School.
- Instructors can teach up-to 3 subjects.
- The same subject can be taught by different instructors.
- Students can be enrolled in more than one school.