Problem 1 (50%)  
Figure 1 shows a model of an industrial process. The model has been altered so that the process specifics are not revealed as no industry allows sharing process models with potential competitors.

Based on the information contained in this model provide answers to the following questions:
1. Is his model IDEF0 or IDEF3? Justify the answer.
2. What is the number of activities or functions in the model?
3. Where in the model would you insert an exclusive or (X) logical junction? Draw it on the process model and justify the answer.
4. If the goal of the process modeling and reengineering was to reduce the number of activities in the model by one, which activities would you merge? Redrew then relevant part of the model and justify the answer.
Figure 1. Process model.
Problem 1 part 1
This model is IDEF3 because of the following:
- Activities modeled in the process
- 3 (4) ICOMS
- Logical Connectors can be added
- Process has a Sequence

Problem 1 part 2
There are in all 12 activities that are modeled in the system.

Problem 1 part 3
The exclusive or (X) logical junction is used mainly for decision making and following one path. Thus the most logical place to put them are either after QC inspection (Activity 4) or at Repair/Reject (Activity 8).
Problem 1 part 4
The Process below gives some sort of information regarding the product. Here we assume that both handles are required as they most probably will be part of the product.
There are several ways of reducing the activities some costly while others may be less expensive.
The options are:
1. Simultaneously attaching the handles (ABC and AAA). This would require special fixture and may increase the cost.
2. Can shift the inspection (original Activity 4) after Insert spacing and then combine the repair/reject activity here. This way the inspection is done before the packing process starts helping to reduce the number of activities needed to carry out the repair.
3. Activities of insert manual and insert Part ACD can be combined into one. This may not cost more.

Option 1

Option 1 & 2
**Problem 2 (25%)**

Figure 1 illustrates four IDEF3 logical junctions.
Figure 2. Logical junctions

(a) Name each junction.
(b) Is it possible that the outcome of (a) and (b) are equivalent? If yes, when?
(c) Is it possible that the outcome of (c) and (d) are equivalent? If yes, when?
(d) Is it possible that the outcome of (a) and (d) are equivalent? If yes, when?
(e) Is it possible that the outcome of (b) and (c) are equivalent? If yes, when?

Problem 2 Part a
- In figure 2 a, the logical junction is **Asynchronous OR connector**: Any combination of inputs/outputs happens asynchronously. INPUTS: One or more of the preceding OR processes must complete, OUTPUTS: One or more of the following processes will start.
- In figure 2 b, the logical junction is **Asynchronous AND connector**: All inputs/outputs happen asynchronously. INPUTS: All preceding processes must complete, OUTPUTS: All following processes will start.
- In figure 2 c, the logical junction is **Synchronous OR connector**: Any combination of inputs/outputs can happen at the same time. INPUTS: One or more of the preceding OR processes must complete simultaneously, OUTPUTS: One or more of the following processes will start simultaneously.
- In figure 2 d, the logical junction is **Exclusive OR connector**: Exactly one of the inputs/outputs happens. Exclusive OR = INPUTS: Exactly one of the preceding processes must complete, OUTPUTS: Exactly one of the following processes will start.

Problem 2 Part b
Yes, when both Activity 2 and Activity 3 start in (a).

Problem 2 Part c
Yes, when only one activity starts in (c)

Problem 2 Part d
Yes, when only one activity starts in (a)

Problem 2 Part e
No.

**Problem 3 (25%)**
Company AA considers consolidating three design groups into an integrated design team. Draw an IDEF3 model of the integrated design group based on the three IDEF models in Figure 3.
Figure 3. Simplified IDEF3 models of three design groups.

The integrated design is as follows: