1. (12%) The following table contains information regarding jobs that are to be scheduled through one machine. Using the following rules to determine the mean flow time the mean lateness. (a) FCFS (first-come-first-served), (b) SOT (shortest operating time), (c) STR (slack time remaining), (d) EDD (earliest due date).

Job	Processing time	Due date
A	6	24
B	13	22
C	3	17
D	10	18
E	8	16
F	4	7
G	7	12

2. (9%) Briefly describe the steps of John's rule for scheduling n jobs on two machines.

3. (12%) A company manufactures a mix of three products (A, B, C) that are assembled at four stations (W, X, Y, Z). The product information (selling price, weekly demand, material cost, and operating time) and process sequences are shown in the following diagram. Each work station is staffed by one highly-skilled worker paid $15 per hour. The plant operates 8-hour shift per day and 5-day per week. Overhead costs are $9,000 per week. Determine the best product mix and calculate associated profit.
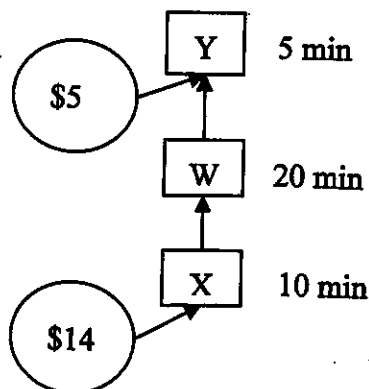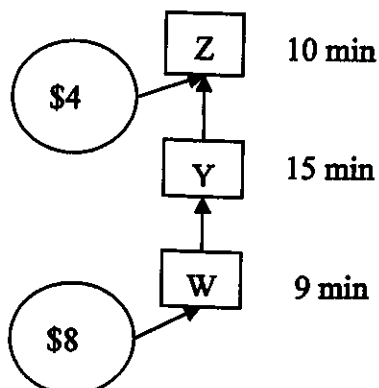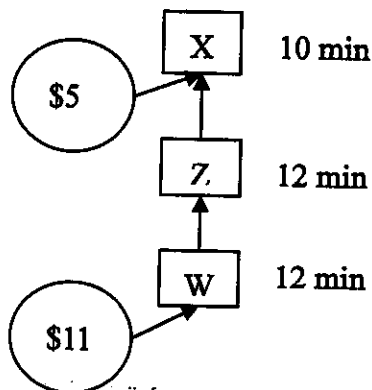
A- Price: $105
Demand:
70 units/week

B- Price: $95
Demand:
80 units/week

C- Price: $115
Demand:
60 units/week

4. (15%) Two different forecasting techniques (Method A and Method B) were applied to forecast sales of a product. Actual sales, the two sets of forecasts, and some figures computed are listed as follows:

Period (1)	Actual Sales (2)	Sales Forecast by Model A (3)	(4)=(2)-(3)	(5)=|(4)|	(6)=(4)²	(7)=(5)/(2)	(8)=(4)/(2)	Sales Forecast by Model B (9)	(10)=(2)-(9)	(11)=|(10)|	(12)=(10)²	(13)=(11)/(2)	(14)=(10)/(2)
1	68	66	2	2	4	0.0294	0.0294	66	2	2	4	0.0294	0.0294
2	75	68	7	7	49	0.0933	0.0933	68	7	7	49	0.0933	0.0933
3	70	72	-2	2	4	0.0286	-0.0286	70	0	0	0	0.0000	0.0000
4	74	71	3	3	9	0.0405	0.0405	72	2	2	4	0.0270	0.0270
5	69	72	-3	3	9	0.0435	-0.0435	74	-5	5	25	0.0725	-0.0725
6	72	70	2	2	4	0.0278	0.0278	76	-4	4	16	0.0556	-0.0556
7	80	71	9	9	81	0.1125	0.1125	78	2	2	4	0.0250	0.0250
8	78	74	4	4	16	0.0513	0.0513	80	-2	2	4	0.0256	-0.0256
Sum			22	32	176	0.4269	0.2828		2	24	106	0.3284	0.0211

Based on the figures shown, please answer the following questions.
(a) (3%) What is the mean absolute deviation (MAD) for the forecasts made by Model A?
(b) (3%) What is the mean absolute percent error (MAPE) for the forecasts made by Model B?
(c) (6%) Please compute a tracking signal for period 8 for each forecast using the cumulative error for periods 1 to 8. What do these two tracking signals tell you?
(d) (3%) Which model is a better one to choose from? Please explain why.

5. (4%) The utilization of a machine is 50%. The machine has a design capacity of 70 units per hour and an effective capacity of 60 units per hour. Find the efficiency of the machine.

6. (5%) What are the differences among a strategic, tactical or operational issue?

7. (9%) Please list three possible actions that might result in the presence of the bullwhip effects. For each of the actions you listed, please specify the reasons to justify. Here is an example of the expected format on the answers:

Possible action 1: Make forecasting based on orders received but not actual consumers' demand.

Reasons: When each stage of supply chain make its own forecasting based on the orders it received without considering the end-market's demand, the decision makers in each stage tend to add safety buffer to their orders to the previous stage for protection thus the fluctuations in inventory would be magnified, moving backward through the chain from the end consumers.

Please follow the abovementioned format when answering this question. Fail to do so will not earn any points. (You cannot use the same action as described in the example.)

國立交通大學 104 學年度碩士班考試入學試題

科目：生產管理(5053)　　　　　　　　　　考試日期:104 年 2 月 7 日　第 4 節
系所班別：工業工程與管理學系　　　組別：工工管系乙組　　　第 3 頁, 共 3 頁
【可使用計算機】＊作答前請先核對試題、答案卷(試卷)與准考證之所組別與考科是否相符！！

8. (14%) What is an aggregate production planning (APP) problem? Why do we need to solve a production planning problem in "aggregate" way? Describe such a problem in terms of given parameters, decision variables, objective function, and constraints.

9. (10%) Describe the differences and relationship between ERP (Enterprise Resource Planning) and MRP (Material Requirements Planning).

10. (10%) Describe the differences and the relationship between dependent demand and independent demand, from perspective of production planning.