1 (18%) The route sheet for a handle used in medical diagnostic equipment is given in the accompanying table. Also given are the desired hourly output and scrap rate for each machine.

Operation code	Machine code	Machine name	Required output	Scrap rate
10	2053	Lathe	103	5%
20	1226	Drill	100	8%
30	3029	Knurl	100	12%
40	3007	Buff	100	10%

Assuming that each machine has 90% manufacturing efficiency, determine the required input and how many machines of each type Medquip Company, Inc., must purchase if the production rates at the lathe, drill, knurl, and buff are 6, 10, 15, and 18 units per hour, respectively.

2 (20%) A firm engaged in manufacturing must also be concerned with its physical facilities. The term *plant layout* refers to the arrangement of these physical facilities in a production plant. There are four principle types of plant layout as: *fixed position layout, process layout, Group layout* and *product-flow layout.* Explain briefly each of these layout types. Their respective advantages and limitations. What kind of manufacturing environments is each of these types of layout designs best suited for?

3 (15%) Quarter-inch stainless-steel bolts, one inch long are consumed in a factory at a fairly steady rate of 60 per week. The bolts cost the plant two cents each. It costs the plant $12 to initiate an order, and holding costs are based on an annual interest rate of 25%. (Hint: use Harris's EOQ model)

a) Determine the optimal number of bolts for the plant to purchase and the time between placement of orders.

b) What is the yearly holding and setup costs for this item?

c) Suppose instead of small bolts we were talking about a bulky item, such as packaging materials. What problem might there be with our analysis?

4 (5%) What is the key difference in the modeling assumptions between the EOQ and the Wagner-Whitin models?

(背面仍有題目,請繼續作答)

5 (15%) Suppose demand for a power steering gear assembly is given by

Period	1	2	3	4	5	6	7	8	9	10
Demand	45	65	35	40	0	0	33	0	32	25

Currently there are 150 parts on hand. Production is planned using *fixed order period* method and two periods. The lead time is three periods. Determine the planned order release schedule.

6 (7%) Under the JIT (Just-In-Time) philosophy, why does inventory often have negative impact on production performances?

7 (20%) Suppose the monthly sales for a particular product for the past 10 months have been as follows:

Month	1	2	3	4	5	6	7	8	9	10
Sales	22	21	24	30	25	25	33	40	36	39

a) Use a five period moving average to compute forecasts of sales for months 8 to 10 and a seven period moving average to compute forecasts for months 8 to 10. Which fit the data better for months 8 to 10? Explain.

b) Use an exponential smoothing approach with smoothing constant α=0.2 to forecast sales for months 2 to 5.