



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
(TAKE HOME)
SEMESTER II
SESSION 2019/2020**

COURSE NAME : MANUFACTURING CONTROL
COURSE CODE : BBM 40402
PROGRAM CODE : BBA / BBD
DATE : JULY 2020
DURATION : 24 HOURS
INSTRUCTION : (1) ANSWER **ALL** QUESTIONS.
(2) ELECTRONIC SUBMISSION OF ANSWER SCRIPT ONLY
(3) FOLLOW THE INSTRUCTION OF SUBMISSION PORTAL

THIS QUESTION PAPER CONSIST OF FIVE (5) PAGES

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- Q1** An electrical appliance company produces four products with forecast of demand for Year 2020 as shown in Table Q1(a). General information on production cost is as shown in Table Q1(b), with cost and productivity information of a full-time worker and a part-time worker are as shown in Table Q1(c) and Q1(d), respectively. It is assumed that an averaged production rate is applied during the three months production.

Table Q1(a): Monthly Demand Forecast for First Quarter of Year 2020

Month	Expected Demand	Production Days
January	4000	20
February	4900	20
March	3360	12

Table Q1(b): General Cost Information

Averaged Inventory Cost	RM 1.90 / unit product
Cost of Hiring a Full Time Worker (incl. recruitment, admin cost, travel & training)	RM 1,800 / person
Cost of Hiring a Part Time Worker (incl. cost of training)	RM 800 / person
Cost of Lay-off a Full Time Worker (incl. compensation)	RM 1000 / person

Table Q1(c): Cost and Productivity of a Full-Time Worker

Working Hours	8 hours / day
Hourly Pay Rate	RM 10 / hour
Overtime Pay Rate	RM 12 / hour
EPF Contribution & Insurance	RM 2 / hour
Productivity (Averaged)	1.85 hours / product

Table Q1(d): Cost and Productivity of a Part-Time Worker

Working Hours	8 hours / day
Hourly Pay Rate	RM 4 / hour
Productivity (Averaged)	2.1 hours / product

- (a) Calculate the average total inventory carrying cost. (4 marks)
- (b) Estimate the total labor cost if only trained full-time workers are hired. Assume averaged production rate is used throughout the three months. (10 marks)

(c) If the company wishes to limit the number of trained full-time workers to only 40 persons, and the rest of the production are fulfilled through hiring part time workers, calculate the total labor cost involved. Assume averaged production rate is used throughout the three months.

(10 marks)

(d) Compare your answers in Q1(b) and Q1(c). Discuss one (1) advantage and one (1) disadvantage associated with each approach.

(8 marks)

Q2 Corresponding to the monthly forecast in Table Q1(a), a detailed master production schedule (MPS) with specific product type and quantity is as shown in Table Q2(a). After some method analysis, the detailed productivity (per product) of a full time worker is as indicated in Table Q2(b).

Table Q2(a): Master Production Schedule (MPS), First Quarter of Year 2020

Month Week	January				February				March				April				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Product	A	200	300	250	150	100	150	200	120	110	150	120	120	20	20	10	5
	B	100	120	180	220	300	350	500	420	260	250	220	180	20	30	50	60
	F	200	300	260	150	100	200	300	200	120	160	120	120	20	20	10	5
	I	300	450	450	370	220	500	700	540	380	400	350	300	40	60	80	70
Total Monthly Demand	4000				4900				3360				520				
Days of Production	20				20				12				0				

Table Q2(b): Detailed Productivity of a Full Time Worker

Productivity (one unit of Product A)	1.2 hours / product
Productivity (one unit of Product B)	2.2 hours / product
Productivity (one unit of Product C)	2.4 hours / product
Productivity (one unit of Product D)	1.6 hours / product

(a) Assuming every trained worker is skillful in producing all the four products, calculate the average number of full-time workers required for each product and the total number of workers required from January to March 2020.

(10 marks)

(b) Based on your answers in Q2(a), if all demands are fulfilled only by full-time workers, calculate the new total cost of hiring. Assume that averaged production rate is applied.

(5 marks)

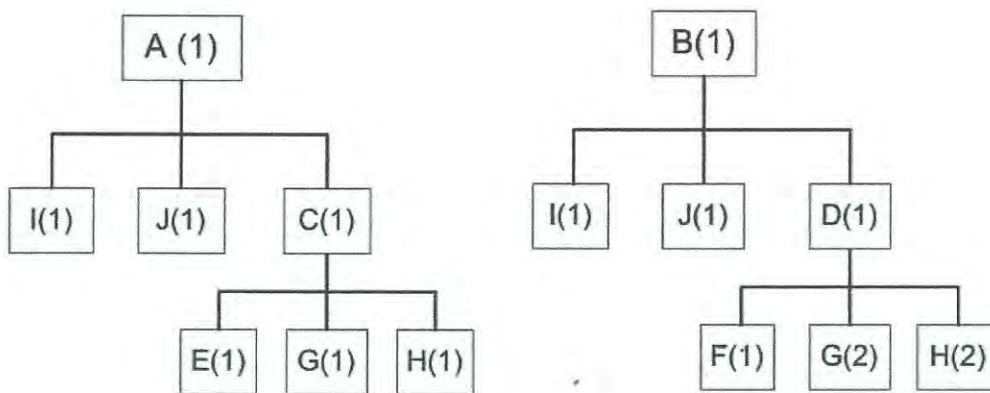
(c) Explain the reason for any difference in answers by comparing your answers in Q2(b) with your answers obtained in Q1(b).
(5 marks)

(d) Based on your answers in Q2(b), explain how improvements can be made to reduce total cost of labor.
(4 marks)

Q3 Corresponding to the MPS as indicated in Table Q2(a), the electrical appliance company actually manufacture two types of document printer: CP100 (Product A) for home use, and CP200 (Product B) for office use. The company also produces in-house another two essential components of Printhead Motor 1 (Product E) and Paper Roller and Feed (Product I). Table Q3 shows the lead time for all the components, with product structure and the required number of components for the two printers are as shown in Figure Q3.

Table Q3: Lead Time for Components

Label	Lead Component	Lead Time (weeks)
A	CP100	2
B	CP200	2
C	Printing Subassembly 1	1
D	Printing Subassembly 2	2
F	Printhead Motor 1	1
F	Printhead Motor 2	2
G	Stabilizer Bar	1
H	Belt	1
I	Paper Roller & Feed	1
J	System Board	2



() = Number of Components

Figure Q3: Bill of Materials for Product A and B



- (a) After a stock check, a production engineer discovered safety stocks for components (as of 1st January) as follows: 200 units of Printhead Motor 1, 1000 units of Stabilizer Bar, 500 units of Paper Roller & Feed and 300 units of System Board. Assuming the demand for all the four products (Product A, B, E & I) are as indicated in Table Q2(a), generate the net material requirement planning (MRP) for the months of February and March only, for all product components, with consideration of current stock availability. Assume that the demand for product E and I in Table Q2(a) as individual product demand
- (20 marks)

- (b) Due to the COVID-19 global pandemic and the enforced movement control order (MCO), there are no production activity in the month of April. However, there are some minimal expected demand from online orders. Generate a new MRP that incorporate the demands in April and determine the quantity of order releases that may be unfulfilled for each of the four products (Product A, B, E & I).
- (8 marks)

Q4 Upon receiving orders, a work cell at company's production plant has received tasks in orders of arrival, as shown in Table Q4.

Table Q4: Job Tasks for Machining Center

Task	Processing Time (Weeks)	Due Date (Weeks)
A-1011	2	3
D-4012	2	8
C-3120	1	5
B-2011	2	4
A-1012	2	4
D-4011	2	6
C-3121	1	6
B-2012	2	5

- (a) Determine the best job sequence according to the following rules: first-come, first serve (FCFS), shortest processing time (SPT) and earliest due date (EDD). Justify your answers through scheduling metrics.
- (12 marks)
- (b) Given job tasks with same processing time, will the difference in job sequences for these job tasks make a significant difference to schedule metrics if shortest processing time is applied? Justify your answers through scheduling metrics.
- (4 marks)

-END OF QUESTIONS-

