



UNIVERSITY OF RUHUNA
FACULTY OF GRADUATE STUDIES

No. of Pages: 06
No. of Questions: 06
Total Marks: 60

PDBA/MBA 108- OPERATIONS MANAGEMENT

MASTER OF BUSINESS ADMINISTRATION (MBA) DEGREE

PART I SECOND SEMESTER END EXAMINATION – MAY / JUNE 2019

Three Hours

Instructions

- ➔ Answer five (05) questions only.

Question 1

- i. The design of products and services is a fundamental aspect of operations management. Explain how product and service design helps to shape the organization's competitive position.

(06 marks)

- ii. As a regional sales manager, Nisha Fernando travels frequently and relies on her mobile phone to keep up to date with clients. She has tried three different service providers, A, B, and C with varying degrees of success. The mean time between failures and the average time to regain service are shown below. Nisha's contract is up for renewal. Which mobile service should she use?

Service provider	Mean time between failures (Minutes)	Time to regain service (Minutes)
A	48	2
B	60	4
C	160	10

(06 marks)

(Total 12 marks)

Question 2

- i. Why is accurate forecasting so important to companies that use a continuous replenishment inventory system?

(04 marks)

- ii. Mr. Jayasekera runs a pet store and has noticed that the increase in the number of tropical fish sales for a month seems to be associated with the number of new fish tanks sold the month before. The following data has been extracted from Jayasekera's business.

Month	Tanks	Fish sales
February	14	-
March	20	165
April	15	195
May	20	210
June	16	255
July	10	160
August	18	112
September	24	200
October	35	290
November	40	350
December	30	420

Develop a linear regression model for this data, and forecast fish sales for next January if 30 tanks are sold in December.

(08 marks)

(Total 12 marks)

Question 3

Following table gives the breakdown structure of the proposed warehouse project of Lanka Timber Company.

Activity	Immediate Predecessor (s)	Time (Weeks)
A	-	3
B	-	4
C	A	6
D	B	9
E	B	6
F	C, D	6
G	D, E	8
H	G, F	9

You are required to draw the network corresponding to the above project, identify the critical path, and specify project completion time. In addition, explain why is knowing the critical path in a project important?

(Total 12 marks)

Question 4

KDK retail shop experiences a seasonal demand pattern for its X product. Labour requirements over a typical six-month period is given in following table.

Period	1	2	3	4	5	6
Requirement	7	8	9	11	12	7

Costs associated with operations are as follows:

- Wages = Rs. 2,000 per worker per month
- Hiring cost = Rs. 1,000 per worker
- Layoff cost = Rs. 1,500 per worker

The current workforce level is 10 workers.

You are required to answer the following questions:

- i. The total cost of the staffing plan (including the cost of regular wages, hiring, and layoffs) using Chase strategy with hiring and layoffs, but no overtime.

(06 marks)

- ii. The total cost of the staffing plan, using Level strategy where overtime and the under time are not allowed.

(06 marks)

(Total 12 marks)

Question 5

The number of loads of material moved from department to department at existing operations in plants is shown below. Develop a layout diagram in a 2 x 3 grid so that nonadjacent loads are minimized.

From / To	Load summary chart					
	1	2	3	4	5	6
1		85	90		105	65
2	10			50	50	
3	25				75	
4	90	60			80	
5	30	40	40	65		75
6	70				40	

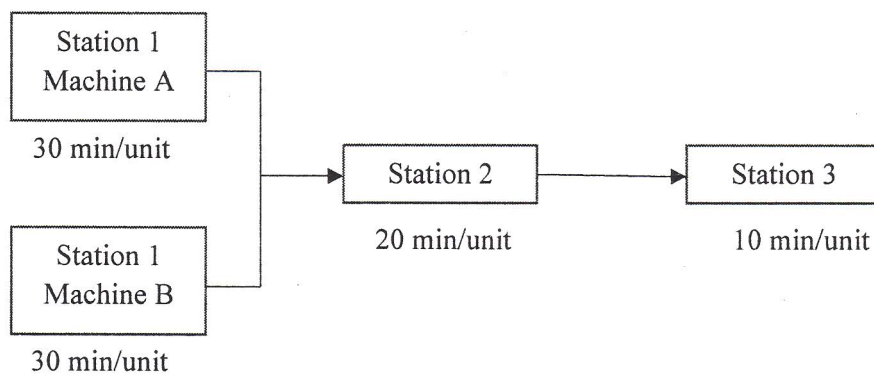
(Total 12 marks)

Question 6

- i. A coffee shop in Matara is open 250 days a year and sells an average of 60 Kgs of coffee beans a day. (Demand can be assumed to be distributed normally, with a standard deviation of 8 Kgs per day.). After ordering (fixed cost = Rs. 27 per order), beans are always sent by supplier within exactly 4 days. Annual holding costs of 1 Kg for the beans are Rs.4.
- What is the economic order quantity (EOQ)?
 - Calculate the annual holding cost.
 - Calculate the annual ordering cost.
 - Assume that management has specified that no more than a 1% risk during stock out is acceptable. What should the reorder point (ROP) be? (Note: $Z = 2.33$ @ 99% service level)
 - What is the safety stock needed to attain a 1% risk of stock out during lead time?
 - What is the annual holding cost of maintaining the level of safety stock needed to support a 1% risk?
 - If management specified that a 5% risk of stock out during lead time would be acceptable, would the safety stock holding costs decrease or increase? ((Note: $Z = 1.645$ @ 95% service level)

(08 marks)

- ii. The three-station work cell at XY Company, is illustrated in the following figure. It has two machines at station 1 in parallel (i.e., the product needs to go through only one of the two machines before proceeding to station 2).



- What is the throughput time of this work cell?
- What is the bottleneck time of this work cell?
- What is the bottleneck station?
- If the firm operates 8 hours per day, 6 days per week, what is the weekly capacity of this work cell?

(04 marks)

(Total 12 marks)

List of formula

$$a = \bar{y} - b \bar{x}$$

$$b = \frac{\Sigma xy - n\bar{x}\bar{y}}{\Sigma x^2 - n\bar{x}^2}$$

$$Q = \sqrt{\frac{2DS}{H}}$$

$$Q = \sqrt{\frac{2DS}{H \left[1 - \frac{d}{p}\right]}}$$

$$TC = \frac{D}{Q} \times S + \frac{Q}{2} \times H$$

$$TC = \frac{1}{2}HQ \left[1 - \frac{d}{p}\right] + \frac{D}{Q} \times S$$

$$ROP = \bar{d}L + ss$$

$$SS = Z\sigma_{dLT}$$

$$\sigma_{dLT} = \sqrt{\sigma_d^2 L} = \sigma_d \sqrt{L}$$