Exam Date & Time: 05-Dec-2023 (02:30 PM - 05:30 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

VII SEMESTER B.TECH END SEMESTER EXAMINATIONS, Dec 2023 Supply Chain Management MME 4086

Supply Chain Management [MME 4086]

Marks: 50

Duration: 180 mins.

A

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1) For the data of a project given below,

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Α	1
11	1

Activity	Preceding activity	Time Estimates (Days)		
Activity	Treeeding activity	Optimistic	Most Likely	Pessimistic
Α		4	6	8
В		2	3	10
С		6	8	16
D	А	1	2	3
E	В	6	7	8
F	В	6	7	14
G	D, E	3	5	7
H	D,E	4	11	12
Ι	F	2	4	6
J	G	2	9	10

i)Draw the project network diagram

ii)Find the critical path

iii)Find the probability that the project is completed in 19 days. If the obtained probability is less than 20 %, find the probability of it completing in 24 days.

- B) Identify the different decision phases in supply chain management and describe the same.
- (3)

(5)

- C) Briefly explain about the PERT and CPM by listing out the differences amongst them.
- (2)
- A contract manufacturer has identified two customer segments for its production capacityone willing to place an order more than one week in advance and the other willing to pay a higher price as long as it can provide less than one week's notice for production. The customers that are unwilling to commit in advance are less price sensitive and have a
 - A) customers that are unwilling to commit in advance are less price sensitive and have a demand curve d1 = 5000 20p1. Customers willing to commit in advance are more price sensitive and have a demand curve of d2 = 5000 40p1. Production cost is c = \$10 per unit. What price should the contract manufacturer charge each segment if its goal is to maximize

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profits? If the contract manufacturer were to charge a single price over both segments, what should it be? How much increase in profits does differential pricing provide?

B) An automobile manufacturer is negotiating a contract for the production of 20 vehicles. The initial vehicle required 400 days of labour. The learning percentage is 80 percent. Estimate the expected number of days of direct labour for

i)The 20th vehicle

ii)All 20 vehicles

iii)The average time for 20 vehicles.

- C) Briefly explain about the classification of inventory in supply chain. (3)
- Best Buy sells three models of computers, the Litepro, the Medpro, and the Heavypro. Annual demands for the three products are DL = 12000 for the Litepro, DM = 1200 units for the Medpro, and DH = 120 units for the Heavypro. Each model costs Best Buy \$500. A fixed transportation cost of \$4000 is incurred each time an order is delivered. For each model ordered and delivered on the same truck, an additional fixed cost of \$1000 is incurred for receiving and storage. Best Buy incurs a holding cost of 20 percent. Evaluate the lot sizes that the Best Buy manager should order if lots for each product are ordered and delivered independently. Also evaluate the annual cost of such a policy.
 - B) Summarize the objectives of inventory management system. (3)
 - C) Describe the various factors affecting the facility location which determines the suitable site for the operation of the company. (3)
- 4) A medical group is planning to set up a new health care facility in a state to serve seven possible locations. The coordinates for each location and projected population measured in thousands is shown in the table below. Customers will travel from their respective locations to the new facility when they
 - A) need health care. Location C and Location F are considered as possible locations for the new facility using rectilinear distance and population a loads which location is better in terms of its total LD score?

Location	Population X 10 ³	X-coordinate	Y-Coordinate	l
А	2	2.5	4.5	l
В	5	2.5	2.5	(4)
С	10	5.5	4.5	l
D	7	5	2	l
E	10	8	5	l
F	20	7	2	l
G	14	9	2.5	

B) Interpret the factors affecting the transportation decision in supply chain management.

(3)

(3)

(3)

C) With the sketch, describe the following transposition designs

i)Direct Shipment

ii)Direct shipment via distribution centre.

5) For the given data of transportation cost (in Rs) between various source and destination, find the initial basic feasible solution by North West Corner (NWC) method.

A)

	D1	D2	D3	D4	Availability
Α	11	13	17	14	250
В	16	18	14	10	300
С	21	24	13	10	400
Requirement	200	225	275	250	

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B) The forecast for a logistic firm estimates that the firm will have to handle a demand of 100000 units for each of the next three years. The firm requires 1000 square feet of warehouse space for every 1000 units of demand.

The firm receives revenue of \$1.22 for each unit of demand. The general manager must decide whether to sign a three-year lease or obtain warehousing space on the spot market each year. The three-year lease will cost \$1 per square foot per year, and the spot market rate is expected to be \$1.20 per square foot per year for each of the three years. The firm has a discount rate of k = 0.1. Consider only cost the firm faces is the cost for the warehouse. Determine whether to obtain the warehousing place by the lease or through spot market each year.

Justify your selection based on the NPV of the firm.

C) Assume that weekly demand for phones at B & M office supplies is normally distributed with a mean of 2500 and a standard deviation of 500. The manufacturer takes two weeks to fill an order placed by the B&M manager. The store manager currently orders 10000 phones when the inventory on hand drops to 6000. Evaluate the safety inventory and the average inventory carried by B &M. Also evaluate the average time a phone spends at B&M.

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(4)