

**MCL756- Supply Chain Management/Marks: 40/Weightage: 20 %**

- 1 (a) Explain implications of the following events on the management of respective supply chains.
1. Because of disruptions in supplies of semi-conductor items from Taiwan, Tata Motors has to close down some of the manufacturing plants.
  2. Arvind Mills has introduced a body scanning system for taking customer's requirements for apparels.
- 1 (b) In the context of selective inventory management, comment on the following statements:
1. "It is not desirable to aim at 90% service level for an A-class but noncritical (E or D) class".
  2. "It will be unfortunate if an aircraft engine maintenance is delayed because of the non-availability of a particular type of special 'washer' required in the process".
  3. "The models relevant for inventory planning for fast moving items are evidently unsuitable for application for slow moving items"

[Marks: 5+7.5=12.5]

- 2 (a) Acme Ltd (AL) is interested in locating a new facility in a target market and would like to know the most appropriate place in the target market to locate the proposed facility. There are three supply points A, B, and C in the locality that will provide key inputs to the new facility. The annual supply from these three points to the proposed facility is 200, 450, and 175 tonnes respectively. There are two possible candidates for the new facility (Alpha and Beta) with the coordinates as given in the table.

Existing supply points			Candidates for proposed facility		
	X coordinate	Y coordinate		X coordinate	Y coordinate
A	125	550	Alpha	300	500
B	350	400	Beta	400	200
C	450	125			

Find the desired location (out of Alpha and Beta) for the new facility. State all your assumptions very clearly.

- 2(b) The demand for a product in past 10 periods are: 10, 18, 29, 15, 30, 12, 16, 8, 22, 14 unit/day. Should you use exponential smoothing or a linear regression model to forecast the demand; In case you decide to use exponential smoothing assuming the forecast for period one to be 12 units and  $\alpha = 0.1$  find the MAD of the forecasting model based on first 5 periods.

[Marks: 8+4.5=12.5]

- 3(a) Apex Ltd (AXL) has three plants (A, B and C) and three depots (P, Q and R). Each plant supplies to each of the depots. Weekly demand at each of the three depots is 100 units.

Plant	(X, Y) Coordinates	Depots	(X, Y) Coordinates
Plant A (Producing Product M)	(0, 100)	P	(200, 100)
Plant B (Producing product F)	(0, 50)	Q	(200, 50)
Plant C (Producing product K)	(0, 0)	R	(200, 0)

Assume each product (M, F or K) cost Rs 200 per unit. The inventory carrying rate is 20 % per unit per year. A year consists of 52 weeks. The transportation cost is Rs 2 per km. The full truck can carry 300 units in one trip.

The following two options are explored to ship products from plants to depots

- Direct Shipping Option (DSO)- As truck's capacity is 300 units, three weeks' worth of supply will be supplied in every trip (comprising products M, F and K) and this cycle will be repeated every three weeks.
- Milk Run Option (MRO)- Each trip will have one week's worth of aggregated supply of three products (M, F and K) and this cycle will be repeated every week.

Based on the total cost, advise AXL, which option to be preferred (DSO or MRO) and why. State all your assumptions clearly.

- 3(b) Two situations are given. Defend or criticize the inference drawn based on the context defined in these situations.

*Situation 1. Acme is spending Rs. 100 crores annually on consumption of 100 materials. It carries total average inventory of Rs. 50 crores annually and places 2000 orders/year for buying these 100 different types of materials having comparable carrying and ordering costs.*

**Inference:** The current procurement policies of Acme are rational (Assume that the value of constant in the exchange curve is 90,000).

*Situation 2 T-shirts are purchased for a charity event by IIT Alumni Association IITDAA for Rs 800 each. When sold during the event the selling price is Rs 2000. After the event their salvage value is just Rs 200. From past events, IITDAA know the probability of selling different quantities of T-shirts*

Demand (units)	800	900	1000	1100	1200	1300
Probability	0.20	0.25	0.30	0.15	0.10	0

**Inference:** IITDAA should purchase 1100 T-shirts before the beginning of the event

[Marks: 9+6=15]