Solution of Case-Study (MGT-613)

Answer 1: 3 marks

Period	Units	Forecast
1	56	----
2	61	56
3	55	58
4	70	56.80
5	66	62.08
6	65	63.65
7	72	64.18
8	75	67.31
9		70.39

Step 1:

Compute the exponential smoothing forecast with alpha=0.4 using the following formula:

$$F_{t+1} = \alpha D_t + (1-\alpha) F_t$$

F_t is forecast value of previous period

F_{t+1} is forecast value of coming period

D_t Actual Demand of previous period

α is alpha which is smoothing constant

No forecast can be done for period 1. For period 2, taking F_t = 56 which is previous period's demand, the forecast will be:

$$F_{t+1} = \alpha D_t + (1-\alpha) F_t$$

F_2 = (0.4)(56) + (0.6)(56)

= 56

For period 3 the forecast is

F_3 = (0.4)(61) + (0.6)(56)

F3 = 58 The remaining forecasts are computed similarly.

Answer 2: 2 marks

$$V = \frac{FC}{P - VC}$$

$$= \frac{2000}{10 - 5}$$

$$= 400\_units$$

Answer 3: 2 marks

Calculating optimal order size using following formula:

$$Q_{OPT} = \sqrt{\frac{2DS}{H}} = \sqrt{\frac{2(\text{Annual Demand})(\text{Order or Setup Cost})}{\text{Annual Holding Cost}}}$$

$$Q = \sqrt{\frac{2 \times 275 \times 700}{14}}$$

Optimal Order Size = 165.83 units

Answer 4: 2 marks

Calculating Total Cost using following formula:

$$\text{Total cost} = \text{Annual carrying cost} + \text{Annual ordering cost}$$

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

Total cost: = (165.83*14) / 2 + (275*700) / 165.83

Total cost: Rs: 2321.64

Answer 5: 3 marks

First, we will calculate the total cost with the discount offered using the order size of 165.83 calculated in question 3 and the other order size given in question i.e. 200 units

Total cost using order size: 165.83 and discount rate of Rs: 65

Total cost: = (165.83*14) / 2 + (275*700) / 165.83 + (65*700)

Total cost = Rs: 47,821.64

Calculating Total cost using order size: 200 and discount rate of Rs: 59

Total cost: = (200*14) / 2 + (275*700) / 200 + (59*700)

Total cost = Rs: 43,662.50

Making decision

Since the total cost of ordering 165.83 units is higher, the optimal order size keeping the discount rate in view is 200 units with a total cost of RS.43, 662.50.

Answer 6: 2 marks

Step 1:

First find value of $\overline{p}$

$\overline{p}$ = Total number of defectives $\div$ total number of observations

= $\frac{320}{20 \times 200}$ = 0.08

Upper Control Limit = $\overline{p} + Z\sqrt{\frac{\overline{p}(1-\overline{p})}{n}}$

Value of n=200

= 0.08 + (3.00) * (0.019)

= 0.137

Answer 7: 2 marks

Lower Control Limit = $\bar{p} - Z\sqrt{\frac{\bar{p}(1-\bar{p})}{n}}$

= 0.08 – (3.00) * (0.019)

= 0.023

Answer 8: 2 marks

Reliability of an assembly line is the product of reliabilities of individual components. For the in-house assembly line, the reliability now is:

$(0.96) \times (0.96) \times (0.96)$

= 0.8847

This reliability is considerably less than the purchased assembly's reliability of 0.95. This is the reasons of increase in complaints.

Answer 9: 2 marks

To achieve a product reliability of 0.96, each component needs a reliability of 0.983

$\sqrt[3]{0.95}$

= 0.983

Answer 10: 2 marks

$Utilization_{peak}$ = Average Output rate ÷ Peak capacity

= $\frac{50}{100} \times 100\%$ = 50 %

Answer 11: 2 marks

Cycle time is calculated by following formula:

$$C = \frac{1}{r}$$

Here r is the desired output rate in hours per unit.

First convert the desired output rate (2400 units per week) to an hourly rate by dividing the weekly output rate by 40 hours per week to get r = 60 units per hour.

$$C = \frac{1}{r}$$

$$\frac{1}{60} hour/unit = 1 \text{ minute / unit}$$

Answer 12: 3 marks

Calculate the total costs of transportation from source to its respective destination(s)

Plant 1:

Cost of transporting 12,000 units to center Y @ Rs. 4.25 = 51,000

Plant 2:

Cost of transporting 6,000 unit to center X @ Rs. 4 = 24,000

Cost of transporting 4,000 unit to center Y @ Rs. 5 = 20,000

Total transportation cost: Rs. 44,000

Plant 2:

Cost of transporting 6,000 unit to center Y @ Rs. 4.5 = 27,000

Cost of transporting 12,000 unit to center Z @ Rs. 3.75 = 45,000

Total transportation cost: Rs.72, 000

Plant 2 gives minimum transportation costs. So this location will be selected

Answer 13: 3 marks

First, Recalling the rule of ABC classification system:

Group A consists of High Rupee (Monetary) Value, which account for a small portion about approximately 10% of the total inventory usage.

Group B consists of Medium Rupee (Monetary) Value, which account for about approximately 20% of the total inventory usage.

Group C consists of Low Rupee (Monetary) Value, which account for a large portion about 70% of the total inventory usage.

Rank the items according to their total value and compute each items percentage of total quantity

Part	T. cost on units in Rs.	Annual usage	% of T. Quantity
9	30,600	60	6
8	16,000	50	5
2	14,000	40	4
1	5,400	90	9
4	4,800	60	6
3	3,900	100	10
6	3,600	180	18
5	3,000	130	13
10	2,400	120	12
7	1,700	170	17
Total	85,400	1000 units	

Based on simple observation, it appears that the first three items form a group with the highest value, the next three form a second group and the last four items constitute a group. Thus ABC classification for these items will be:

Class	Items	& of total quantity
A	9, 8, 2	15 %
B	1, 4, 3	25 %
C	6, 5, 10, 7	60 %