FINAL EXAMINATION
GROUP - III
(SYLLABUS 2016)

SUGGESTED ANSWERS TO QUESTIONS

DECEMBER - 2017

Paper-15: STRATEGIC COST MANAGEMENT-DECISION MAKING

Time Allowed : 3 Hours   Full Marks : 100

The figures in the margin on the right side indicate full marks.

Answer Question No. 1 in Section A, which is compulsory, carrying 20 marks.

Further, answer any 5 (five) Question from Section B, each carrying 16 marks.

Section – A
(20 Marks)

1. Choose the most appropriate answer to the following questions giving justification. Each question carries 2 (two) marks.   2×10=20

    (i)   The following figures are extracted from the books of a company:

    Budgeted O/H ₹ 10,000 (Fixed ₹ 6,000, Variable ₹ 4,000)

    Budgeted Hours 2000

    Actual O/H ₹ 10,400 (Fixed ₹ 6,100, Variable ₹ 4,300)

    Actual Hours 2100

    Variable O/H cost variance and Fixed O/H cost variance will be:

    (a)   100 (A) and 200 (A)

    (b)   100 (F) and 200 (F)

    (c)   100 (A) and 200 (F)

    (d)   200 (A) and 100 (F)

    (ii) A company produces a product which is sold at a price of ₹ 80. Its Variable cost is ₹ 32. The company's Fixed cost is ₹11,52,000 p.a. The company operates at a margin of safety of 40%. The total sales of the company is:

    (a)   4,000 units

    (b)   40,000 units

    (c)   30,000 units

    (d)   20,000 units

    (iii) The P/V ratio of a firm dealing in Electrical equipment is 50% and the margin of safety is 40%. BEP of the firm at a sales volume of ₹ 50,00,000 will be

    (a)   ₹ 25,00,000

(b) ₹ 35,00,000

(a) ₹ 30,00,000

(b) ₹ 36,00,000

(iv) ABC Limited has current PBIT of ₹19.20 lakhs on total assets of ₹96 lakhs. The company has decided to increase assets by ₹24 lakhs, which is expected to increase the operating profit before depreciation by ₹8.40 lakhs. There will be a net increase in depreciation by ₹4.80 lakhs. This will result in ROI

(a) to increase by 1%

(b) to decrease by 1%

(c) to decrease by 1-5%

(d) to remain the same

(v) For a Learning Curve percentage of 72%, the time to be taken to complete the 4th unit of a 12-unit job involved in the assembly line, if the initial unit requires 80 hours, will be

(a) 43.50 hrs

(b) 41.47 hrs

(c) 46.71 hrs

(d) 40.95 hrs

(vi) Marketing department of an organisation estimates that 40,000 of new mixers could be sold annually at a price of ₹60 each. To design, develop and produce these new mixers an investment of ₹40,00,000 would be required. The company desires a 15% return on investment (ROI). Given these data, the target cost to manufacture, sell, distribute and service one mixer will be

(a) ₹ 37.50

(b) ₹ 40.00

(a) ₹ 45.00

(c) ₹ 48.60

(vii) When you wait until the manufacture of a product has been completed and then record all of the related issuances of inventory from stock that were required to create the product, it is called

(a) Forensic Accounting

(b) Back-flush Accounting

(c) Tax Accounting

(d) Lean Accounting

(vii) Match the following:

(A)	Dr. Deming believes	(1)	Common causes
(B)	Ishikawa development	(2)	To prevent defect
(C)	Type of variation is due to	(3)	Cause & effect diagram
(D)	Crosby's objective of quality	(4)	Histogram

The correct order is

(a) A-3, B-2, C-1, D-4

(b) A-2, B-3, C-4, D-1

(c) A-2, B-3, C-1, D-4

(d) A-4, B-3, C-1, D-2

(ix) Sab Ltd. fixes the inter-divisional transfer prices for its products on the basis of cost plus a return on investment in the division. The budget for division X for 2016-17 appears as under:

	₹
Fixed Assets	5,00,000
Current Assets	3,00,000
Debtors	2,00,000
Annual Fixed cost of the Division	8,00,000
Variable cost per unit of product	10
Budgeted Volume	400000 units per year
Desired R.O.I.	28%

Transfer price for division X is

(a) ₹ 12.70

(b) ₹ 10.70

(c) ₹ 8.70

(d) ₹ 14.70

(x) A company uses traditional standard costing system. The inspection and set-up costs are actually ₹ 1,760 against a budget of ₹ 2,000. ABC system is being implemented and accordingly the number of batches is identified as the cost driver for inspection and set up. The budgeted production is 10,000 units in batches of 1,000 units whereas actually 9,000 units were produced in 11 batches. The cost per batch under ABC system will be

(a) ₹ 160

(b) ₹ 200

(c) ₹ 180

(d) ₹ 220

Answer:

1.

(i) (c) Variable O/H Cost variance = Recovered O/H - Actual O/H

= 4200 – 4300 = 100(A)

Fixed O/H Cost variance = 6300 - 6100 = 200 (F).

(ii) (b) SP 80 – VC 32 = Contribution 48

F.C. 11,52,000

B.E.P. = 11,52,000/48 – 24,000 units

MOS = 40%; B.E.P. = 60%

∴ Total sales = $\frac{24,000 \times 100}{60}$ = 40,000 units.

(iii) (c) Actual Sales - M.O.S. = BEP Sales

Sales = ₹ 50,00,000

Less: Margin of safety 40% on sales = ₹ 20,00,000

Break even sales = ₹ 30,00,000

(iv) (b)		**Before installing new assets**	**After installing new assets**
	PBIT	₹ 19.20 lakhs	= ₹ 19.20 lakhs +(₹ 8.40 lakhs
			– ₹ 4.80 lakhs = ₹ 22.80 lakhs
	Value of Assets	₹ 96.00 lakhs	₹ 96.00 lakhs + ₹ 24.00 lakhs
			= ₹ 120.00 lakhs
	ROT	= 20%	= 19%

Conclusion: There will be a decrease of 1% in ROI under the proposed dispensation.

(v) (b) At 72% Learning Curve,

T-4 - Time taken by the 4th Unit = 80 (.72)(.72) = 41.47 hrs.

Note: In the arithmetic method followed above, every time the number the number of repetitions doubles, the time to perform the activity is reduced by the Learning Curve Coefficient.

(vi) (c) Projected sales (40,000 mixers X ₹60 per mixer) (A) = ₹ 24,00,000

Less desired profit (15% of ₹ 40,00,000) (B) = ₹ 6,00,000

Target Cost for 40,000 mixers (A - B) = ₹ 18,00,000

Target cost per mixer (₹ 18,00,000 / 40,000 mixer) = ₹ 45.00 per unit

(vii) (b) Back-flush Accounting

(viii) (c) A-2, B-3, C-1, D-4

(ix) (a) VC ₹ 10; FC per unit = ₹ 8,00,000 ÷ 4,00,000 = ₹ 2

Total Cost = 10 + 2 = ₹ 12

Required Return = $\frac{₹ 10,00,000 \times 28\%}{4,00,000}$ = 0.70

∴ T.P. ₹ 12 + 0.70 = ₹ 12.70

(x) (b) Number of batches under ABC = 9000 ÷ 1000 = 9

Std. Cost under ABC = Budg Cost / Batch × ABC number of batches

= ₹ 200 × 9 = ₹ 1800

Production	9000 Units
Number of batches	9
Cost /Batch	₹ 200

Section-B

Answer *any five* questions.

Each Question carries 16 Marks.   **16×3=80**

2. **(a)** What do you understand by 'quality' in the context of Quality Cost Management? Explain.   **8**

   (b) Why would you classify costs of quality into different groups? Enumerate them and give suitable examples where possible.   **4+4=8**

Answer:

2. **(a)** Quality is defined (by the American Society) as the total features and characteristics of a product or service made or rendered according to specifications to satisfy customers at the time of purchase and during use. There are two basic aspects of quality: (a) design quality, and (b) conformance quality. Quality of product or service is decided by the customer and is built into the service on product through the design for it. A customer has certain needs or requirements for product or service. It is the design of product or service which builds these requirements as product or service specifications into the product or service–including the way the product or service would be delivered to the customer. The way the product is made or the service is delivered is according to a set of processes which are in sequence. This set of processes, their sequence and interdependence gets defined while the design activity is performed and the design of process has a direct impact on the outcome, that is, the extent to which the outcome meets the specifications developed during design. Process design also contributes to quality. Conformance to specifications measures how well the product or service meets the targets and tolerances determined by its designers. For example, the dimensions of a machine part may be specified by its design engineers as 3 + .05 inches. This would mean that the target dimension is 3 inches but the dimensions can vary between 2.95 and 3.05 inches. Similarly, the wait for hotel room service may be specified as 20 minutes, but there may be an acceptable delay of an additional 10 minutes. Also, consider the amount of light delivered by a 60 watt light bulb. If the bulb delivers 50 watts it does not conform to specifications. As these examples illustrate, conformance to specification is directly measurable, though it may not be directly related to the consumer's idea of quality.

   Thus, actual performance (quality) of a product or service may fall short of customer expectation either due to design quality failure and/or due to conformance quality failure.

Quality has both financial and non-financial perspectives. Financially, it, represents costs of quality where as non-financial measures are the number of customer complaints, defectives to good production (%), employee empowerment and training, etc. Quality affects all aspects of the organization and has dramatic cost implications. The most obvious consequence occurs when poor quality creates dissatisfied customers and eventually leads to loss of business. However, quality has many other costs, which can be divided into two categories. The first category consists of costs necessary for achieving high quality, which are called quality control costs. These are of two types: prevention costs and appraisal costs. The second category consists of the cost consequences of poor quality, which are called quality failure costs. These include external failure costs and internal failure costs. The first two costs are incurred in the hope of preventing the second two.

(b) Costs of quality can be classified into the following groups for better quality costs management: (1) Prevention costs, (2) Appraisal costs, (3) Internal failure costs, (4) External failure costs, (5) opportunity costs (e.g. loss of contribution).

Prevention costs are all costs incurred in the process of preventing poor quality from occurring. They include quality planning costs, such as the costs of developing and implementing a quality plan. Also included are the costs of product and process design, from collecting customer information to designing processes that achieve conformance to specifications. Example; Quality training, Quality circles, Statistical process control activities, System Development for prevention, Quality improvement.

Appraisal costs are incurred in the process of uncovering defects. They include the cost of quality inspections, product testing, and performing audits to make sure that quality standards are being met. Also included in this category are the costs of worker time spent measuring quality and the cost of equipment used for quality appraisal. Example:-testing and inspecting materials, final product testing and inspecting, WIP testing and inspecting, package inspection and depreciation of testing equipment.

Internal failure costs are associated with discovering poor product quality before the product reaches the customer site. One type of internal failure cost is rework, which is the cost of correcting the defective item. Sometimes the item is so defective that it cannot be corrected and must be thrown away. This is called scrap, and its costs include all the material, labor, and machine cost spent in producing the defective product. Example: - cost of scrap (net of realization), cost of spoilage, cost of rework, down time due to defect in quality and retesting.

External failure Costs are incurred when inferior products are delivered to customers. They include cost of handling customer complaints, warranty replacements, repairs of returned products and cost arising from a damaged company reputation. Example: - cost of field servicing, cost of handling complaints, warranty repairs, lost sales, warranty replacements.

For better management, quality costs may be classified into direct (e.g. employees and inspectors involved in defect rectification) and indirect costs (indirect costs are incurred in each of the costs-of-quality activities.

3. (a) The Stock Control Policy of Vidhata Co. is that each stock is ordered twice a year, the quantum of each order being one-half of the year's forecast demand. The Materials Manager, however, wishes to introduce a policy in which for each item of stock, Re-order Levels and EOQ are calculated. For one of the items X, the following information are available:

Forecast Annual Demand	3,600 units
Cost per unit	₹ 100
Cost of Placing an order	₹ 40
Stockholding Cost	20% of the average stock value
Buffer Stock to cover fluctuations in demand	100 Nos.

Required:

If the new policy is adopted, calculate for stock item X,

(i) Re-order Level that would be set by the Materials Manager.

(ii) Anticipated reduction in value of the average stock investment.

(iii) Anticipated reduction in total inventory costs in the first and subsequent years.

2+3+(3+2)=10

(b) The management of W Ltd., which is now operating at 50% capacity, expects that the volume of sales will drop below the present level of 5,000 units per month. The operating statement prepared for monthly sales shows:

	₹	₹
Sales (5,000 units at ₹ 3 per unit)		15,000
Less: Variable Costs at ₹ 2 per unit	10,000	
Fixed Overheads	5,000	15,000
Net Profit		Nil

It is proposed that the company should suspend production until market conditions improve. The General Manager estimated that a minimum of fixed cost (shut down costs) amounting to ₹ 2,000 would be necessary in any event.

Required:

(i) Advise Management at what level of sales it could think of suspending production.

(ii) If the sales price is ₹2.80, what should be the level of sales for shut down decision? 3+3=6

Answer:

3. (a)

i. Reorder Level = Safety Stock + Lead Time Consumption = 100 units (given) + (3,600 units ÷ 12 months) = 100 + 300 = 400 units.

ii. Economic Order Quantity - Square Root of (2AB ÷ C) where

A = Annual Requirement of Raw Materials = 3,600 units,

B = Buying or Ordering Cost per order = ₹ 40

C = Carrying or Stockholding Cost p.u per annum = ₹ 100 × 20%= ₹ 20

On substitution, EOQ = 120 units

Average Stock Quantity under Old Policy = (1,800 units ÷ 2) = 900 units

Average Stock Quantity under EOQ = Safety Stock + (120 units ÷ 2) = 100 units + 60 units = 160 units

Reduction in the value of the Average Stock Investment = (900 – 160) × ₹ 100 = ₹ 74,000.

iii. Cost Comparison of Old Policy and EOQ

Particulars	Old Policy	EOQ
Quantity ordered every time	1,800 units	120 units
Number of orders per annum	2 orders	30 orders
Buying Cost at ₹ 40 per order	2 × ₹40 = ₹ 80	30 × ₹40 = ₹ 1,200
Average Inventory =½ x Quantity	900 units	160 units (iucl. Safety Stock)
Carrying Cost at ₹ 20 per unit	900 × ₹ 20 = ₹ 18,000	160 × ₹20 = ₹3,200
Total Associated Cost	**₹ 18,080**	**₹ 4,400**

Savings in Cost per annum due to EOQ Policy = ₹ 18,080 - ₹4,400 =₹ 13,680

However, for the first year, the Company has to specifically purchase the safety stock also, in addition to the annual consumption requirements. This will be at a cost of ₹100 x 100 units = ₹ 10,000. Hence, savings in the first year will be ₹ 13,680 - ₹ 10,000 = ₹ 3,680.

3. (b)

   (i)   If selling price is ₹ 3 per unit

Shutdown Point = $\dfrac{\text{F. Cost - Shut down cost}}{\text{Contribution pu.}} \times SP$

$= \dfrac{5000 - 2000}{(₹\ 3 - ₹\ 2)} \times ₹\ 3$

= 3000 × 3 = ₹ 9,000

or, 3000 units

Verification of the above is as under:

	₹
Sales 3,000 units @ ₹ 3	9,000
Less: Variable Cost 3,000 units @ ₹ 2	6,000
Contribution	3,000
Less: Fixed Cost	5,000
Operating Loss	2,000

Operating Loss = Loss at Shutdown Point

(ii) If selling price is reduced to ₹2.80

$$\left(\frac{5000 - 2000}{2.80 - 2.00}\right) \times ₹\,2.80$$

= ₹ 10,500

or 3,750 units

4. (a) The following data are obtained from the records of a company:

	Year 1 (₹)	Year 2 (₹)
Sales	80,000	1,00,000
Profit	10,000	15,000

Required:

(i) Calculate Break-even Point

(ii) Profit or Loss when sales amount to ₹ 60,000, and

(iii) Required sales for level of profit of ₹ 20,000.

4+2+2=8

(b) Your company wants to buy one machine. Two alternative models are available — A and B. The following information are available with respect to them:

	Model A	Model B
Output p.a.	10,000	10,000
Fixed costs p.a. (₹)	30,000	16,000
Profit at 100% capacity (₹)	30,000	24,000

Both the machines will produce identical products. The annual market demand for the product is 10,000 units @ ₹ 10 per unit.

Required:

(i) The level of sales at which both are equally profitable;

(ii) The range of sales at which one is more profitable than the other.

4+4=8

Answer:

4. (a)

P/V ratio = $\dfrac{\text{Change in profit}}{\text{Change in sales}} = \dfrac{5,000}{20,000} = \dfrac{1}{4}$ th or 25%

C = F + P

or, F = C − P = 25% of 8,000 − 10,000

= ₹ 10,000

[or, 25% of 1,00,000 − 15,000 = ₹ 10,000]

(i) ∴ BEP = $\dfrac{FC}{P/\,V\;ratio} = \dfrac{₹\,10,000}{.25} = ₹\,40,000$

(ii)   S = ₹ 60,000

P = C – F = 25% of 60,000 – 10,000 = ₹ 5,000

(iii)   Required Sales for (P) = ₹ 20,000

C = F + P = ₹ 10,000 + 20,000 = ₹ 30,000

∴ Required Sales = $\dfrac{₹\ 30,000}{.25}$ = ₹ 1,20,000

(b)

[C = F + P]

	A ₹	B ₹
Sales @ ₹ 10	1,00,000	1,00,000
Contribution	60,000	40,000
P/V ratio	60%	40%
Contribution/unit	6	4
Variable cost/unit	4	6
BEP	5,000 units	4,000 units

(i)   For A : 4x + 30,000

B : 6x + 16,000

∴ 4x + 30,000 = 6x + 16,000 ; Solving X = 7,000 units

(ii)   At 7,000 units both are equally profitable. BEP of A and B being 5,000 units and 4,000 units, Machine B is more profitable below 7,000 units, and A will be more profitable above 7,000 units.

A : Range of production 7,000 to 10,000 units

B : Range of production 4,000 to   6,999 units

5. (a) **Zip Ltd. manufactures three products. The material cost, selling price and bottleneck resource details per unit are as follows:**

Particulars	Product T	Product C	Product S
Selling Price (₹)	66	75	90
Material and other variable cost (₹)	24	30	40
Bottleneck resource time (minutes)	15	15	20

Budgeted factory costs for the period are ₹ 4,43,200. The bottleneck resource time available is 1,50,240 minutes per period.

Required:

(i)   **Company adopted throughput accounting and products are ranked according to 'product return per minute'.**

Select the highest rank product.

(ii) Calculate throughput accounting ratio and comment on it.   3+3=6

(b) Force Ltd. is a manufacturer of a fire fighting equipment which consists of five components three of which are made using general purpose machines and two by manual labour. The data for the manufacture of the equipment are as follows:

Components	F	O	R	C	E	Total
Machine hours required per unit	20	28	24			72 hrs
Labour hours required per unit				2	1	3 hrs
Variable cost per unit ₹	64	108	116	24	8	320
Fixed cost per unit (apportioned) ₹	96	204	232	48	72	632
Total component cost ₹	160	312	348	72	60	952
Assembly cost/unit (all variable) ₹						80
Selling price/unit ₹						1,200

The marketing department of the company anticipates 50% increase in demand during the next period. General purpose machinery used to manufacture. F, O and R are already working to the maximum capacity of 9,504 hours and there is no possibility of increasing this capacity during the next period. But labour is available for making components C and E and also for assembly according to demand. The management is considering the purchase of one of the components F, O or R from the market to meet the increase in demand. These components are available in the market at the following prices:

Component F : ₹ 160

Component O : ₹ 320

Component R : ₹ 250

Required:

(i) Profit made by the company from current operations.

(ii) If the company buys any one of the components F, O or R, what is the extent of additional capacity that can be created?

(iii) Assuming 50% increase in demand during the next period, which component should the company buy from the market?

(iv) The increase in profit, if any, if the component suggested in (iii) is purchased from the market.   2+3+2+3=10

5. (a) (i)   Calculation of Rank according to product return per minute.

(₹)

Particulars	T	C	S
Selling price	66	75	90
Less : Variable Cost	24	30	40
Throughput contribution (a)	42	45	50
Minutes per unit (b)	15	15	20
Contribution per minute (a) ÷ (b)	2.8	3	2.5
Ranking	II	I	III

(ii) Calculation of Throughput Accounting ratio:

Particulars	T	C	S
Factory cost per minute (₹ 2,21,600/75,120 minutes) (₹)	2.95	2.95	2.95
TA Ratio (Contribution per minute/Cost per minute)	0.95	1.02	0.85
Ranking based on TA ratio	II	I	III

Analysis - Product C yields more contribution compared to average factory contribution per minute, whereas T and S yield less.

(b) **(i)** Statement showing profit at current operations :

		₹
SP		1200
Variable Cost	320+80	400
Contribution		800
Number of units	9504/72	Units 132
Total contribution		1,05,600
Fixed Cost		83,424
Profit		22,176

(ii)

	F	O	R
	₹	₹	₹
Buying cost	160	320	250
Variable Cost	64	108	116
Extra buying cost	96	212	134
Excess buying cost per hour	4.8	7.571	5.583

It is better to buy component F from the market because excess buying cost per machine hour is less. Computation of additional capacity created if components are bought from outside:

If F is bought:

Number of units that can be manufactured (9504/52)	182.76 units
Increase in capacity (182.76 - 132/132 x 100)	38.46%
If O is bought:	
Number of units (9504/44)	216
Increase in capacity (216 - 132 / 132 x 100)	63.64%
If R is bought:	
Number of units 9504/48	198
Increase in capacity (198 - 132 /132 x 100)	50%

(iii) F is cheaper to buy. But the increase in capacity will not be sufficient to meet the expected demand for next year. Therefore, we shall try to buy the next cheaper component, i.e., R and by buying it the increase in capacity will be exactly equal to the demand for our product during the next year. Hence, component 'R' should be bought from the market.

(iv) Statement showing computation of profit by buying R from outside :

(i)	No. of units	(9504 / 48)	Units 198
(ii)	Selling price		₹1200
(iii)	Variable Cost	(400-116 + 250)	₹534
(iv)	Contribution		₹666
(v)	Total Contribution		₹131868
(vi)	Fixed Cost		₹83424
(vii)	Profit		₹48444
Less : Existing Profit			₹22176
Increase in profit			₹26268

6. (a) Wipro is examining the profitability and pricing policies of its Software Division. The Software Division develops Software Packages for Engineers. It has collected data on three of its more recent packages — (i) ECE Package for Electronics and Communication Engineers, (ii) CE Package for Computer Engineers, and (iii) IE Package for Industrial Engineers.

Summary details on each package over their two-year cradle to grave product lives are:

Package	Selling Price	Number of units sold	
		Year 1	Year 2
ECE	₹ 250	2,000	8,000
CE	₹ 300	2,000	3,000
IE	₹ 200	5,000	3,000

Assume that no inventory remains on hand at the end of year 2. Wipro is deciding which product lines to emphasize in its software division. In the past two years, the profitability of this division has been mediocre.

Wipro is particularly concerned with the increase in R & D costs in several of its divisions. An analyst at the Software Division pointed out that for one of its most recent packages (IE), major efforts had been made to reduce R&D costs. Last week, Amit, the Software Division Manager, decides to use Life Cycle Costing in his own division. He collects the following Life Cycle Revenue and Cost information for the packages (in ₹):

Particulars	Package ECE		Package CE		Package IE	
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Revenues	5,00,000	20,00,000	6,00,000	9,00,000	10,00,000	6,00,000
Costs:						
R&D	7,00,000	—	4,50,000	—	2,40,000	—
Design of Product	1,15,000	85,000	1,05,000	15,000	76,000	20,000
Manufacturing	25,000	2,75,000	1,10,000	1,00,000	1,65,000	43,000
Marketing	1,60,000	3,40,000	1,50,000	1,20,000	2,08,000	2,40,000
Distribution	15,000	60,000	24,000	36,000	60,000	36,000
Customer Service	50,000	3,25,000	45,000	1,05,000	2,20,000	3,88,000

Required:

Prepare a Product Life Cycle Income Statement for each Software Package. Which package is most profitable and which is the least profitable? How do the three packages differ in their cost structure (the percentage of total costs in each category)?   6+2+2=10

(b) A practicing Cost and Management Accountant now spends ₹ 0.90 per K.M. on taxi fares for his client's work. He is considering two other alternatives - the purchase of a new small car or an old bigger car.

Item	New Small Car	Old Bigger Car
	(₹)	(₹)
Purchase Price	35,000	20,000
Sale Price after 5 years	19,000	12,000
Repairs and servicing per annum	1,000	1,200
Taxes and insurance p.a.	1,700	700
Petrol consumption per litre (k.m.)	10	7
Petrol price per litre	3.5	3.5

He estimates that he will travel 10000 K.M. annually.

Required:

Which of the three alternatives will be cheaper? If his practice expands and he has to travel 19,000 K.M. per annum will the cost of the two cars break even and why? Ignore interest and Income tax.   6

Answer:

6. (a) Life Cycle Income Statement (in ₹ '000)

Particulars	Package ECE				Package CE				Package IE			
	Y1	Y2	Total	%	Y1	Y2	Total	%	Y1	Y2	Total	%
Revenues	500	2,000	2,500	100%	600	900	1,500	100%	1,000	600	1,600	100%
Costs												
R&D	700	-	700	28%	450	-	450	30%	240	-	240	15%
Design	115	85	200	8%	105	15	120	8%	76	20	96	6%
Manufacturing	25	275	300	12%	110	100	210	14%	165	43	208	13%
Marketing	160	340	500	20%	150	120	270	18%	208	240	448	28%
Distribution	15	60	75	3%	24	36	60	4%	60	36	96	6%
Cust. Service	50	325	375	15%	45	105	150	10%	220	388	608	38%
Total Costs	1065	1085	2150	86%	884	376	1260	84%	969	727	1696	106%
Profit			350	14%			240	16%			(96)	-6%

Observation: Package ECE is most profitable, while package IE is least profitable.

(b) Statement showing computation of break-even point for three alternatives:

	Taxi (₹)	New smaller car (₹)	Old bigger car (₹)
Fixed Cost: Depreciation		16000/5 = 3200	8000/5 = 1600
Repairs		1000	1200
Taxes		1700	700
		5900	3500
Variable cost per KM	0.9	0.35	0.5
TOTAL COST PER 10000 KMS	9000	3500 + 5900 = 9400	5000 + 3500 = 8500
Cost per 19000 KMS	17100	12550	13000

(a) At 10000 KMS old bigger car is cheaper than the other two alternatives.

(b) At 19000 KMS it is better and cheaper to purchase the new smaller car.

Indifference point = (difference in fixed cost/difference in variable cost per unit)

$$= (2400/0.15) = 16000 \text{ kms}$$

7. (a) Draw a network from the following activities. Find the critical path and total duration of the project.

Activity	Immediate predecessor activity	Duration (days)
A	—	10
B	A	5
C	A	4
D	A	7
E	B,C	6
F	C,D	4
G	E,F	7

(b) A company produces products P, Q and R from three raw materials A, B and C. One unit of product P requires 2 units of A and 3 units of B. One unit of product Q requires 2 units of B and 5 units of C and one unit of product R requires 3 units of A, 2 units of B and 4 units of C. The company has 8 units of material A, 10 units of B and 15 units of C available to it. Profits per unit of product P, Q and R are ₹ 3, ₹5 and ₹ 4 respectively.
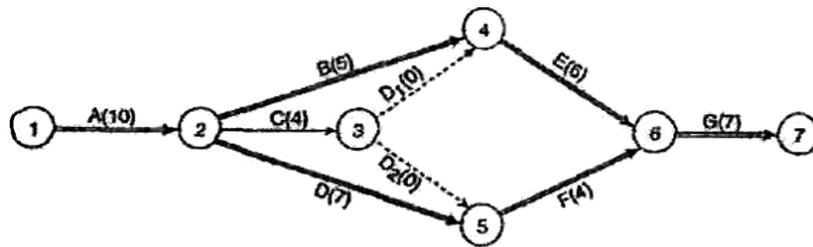
(i) Formulate the problem mathematically.

(ii) Write the Dual problem.   4+4=8

Answer:

7. (a) The network is drawn as follows :

Network Diagram

Various paths Duration of paths (days)

(i)   1-2-4-6-7   10 + 5 + 6 + 7 = 28

(ii)   1-2-3-4-6-7   10 + 4 + 0 + 6 + 7 = 27

(iii) 1-2-3-5-6-7   10 + 4 + 0+4 + 7 = 25

(iv)   1-2-5-6-7   10 + 7 + 4 + 7 = 28

Critical paths are 1-2-4-6-7 and 1-2-5-6-7 with duration of 28 days and are marked with double lines.

(b)

Raw Materials	P	Q	R	Available Units
A	2	-	3	8
B	3	2	2	10
C	-	5	4	15

Profits 3/- , 5/-, 4/-
Let x_1 be the number of units of P
Let x_2 be the number of units of Q
Let x_3 be the number of units of R

(i)   Formulation of the problem
Objective function:
Max $Z = 3x_1 + 5x_2 + 4x_3$
Subject to constraints:
$2x_1 + 3x_3 \leq 8$
$3x_1 + 2x_2 + 2x_3 \leq 10$
$5x_2 + 4x_3 \leq 15$
$X_1, X_2, X_3 \geq 0$.

(ii)   Dual of the problem

Min $C = 8y_1 + 10y_2 + 15y_3$
Subject to constraints:
$2y_1 + 3y_2 \geq 3$
$2y_2 + 5y_3 \geq 5$
$3y_1 + 2y_2 + 4y_3 \geq 4$
$y_1, y_2, y_3 \geq 0$.

8. Write short notes on *any four* of the following:

    (a) Usefulness of Pareto Analysis

    (b) Seven Principles of BRR

    (c) Four P's of TQM

    (d) Lean Accounting

    (e) Value Engineering

Answer:

8.

(a) **Pareto analysis is useful to:** 1. Prioritize problems, goals, and objectives to Identify root causes, 2. Select and define key quality improvement programs, 3. Select key customer relations and service programs, 4. Select key employee relations improvement programs, 5. Select and define *key* performance improvement programs, 6. Maximize research and product development time, 7. Verify operating procedures and manufacturing processes, 8.Product or services sales and distribution, 9.Allocate physical, financial and human resources.

(b) **Seven Principles of BPR:** 1. Processes should be designed to achieve a desired outcome rather than focusing on existing tasks, 2. Personnel who use the output from a process should perform the process, 3. Information processing should be included in the work, which produces the information, 4. Geographically dispersed resources should be treated, as if they are centralized, 5. Parallel activities should be linked rather than integrated, 6. Doers should be allowed to be self-managing, 7. Information should be captured once at source.

(c) **Four P's of TQM**

The 4P's	
People	To ovoid misdirection, TQM teams should consist of team spirited individuals who have a flair for accepting and meeting challenges Individuals who are not ideally suited to the participatory process of TQM. Should not be involved at all. e.g. lack of enthusiasm, non-attendance at TQM meetings, failure to complete delegated work, remaining a "Mute Spectator" at TQM meetings, etc.
Process	It is essential to approach problem-solving practically and to regard the formal process as a system designed to prevent participants from jumping to conclusions. As such, it will provide a means to facilitate the generation of alternatives while ensuring that important discussion stages are not omitted.
Problem	Problems need to be approached in a systematic manner, with teams tackling solvable problems with a direct economic impact, allowing for immediate feedback together with recognition of the

	contribution made by individual participants.
Preparation	Additional training on creative thinking and statistical processes are needed in order to give participants a greater appreciation of the diversity of the process. This training must quickly be extended beyond the immediate accounting circle to include employees at supervisory levels and also who are involved at the data input stagey

(d) Lean Accounting is the general term used for the changes required to a company's accounting, control, measurement, and management processes to support lean manufacturing and lean thinking. Most companies embarking on lean manufacturing soon find that their accounting processes a management methods are at odds with the lean changes they are making. The reason for this is that traditional accounting and management methods were designed to support traditional manufacturing; they are based upon mass production thinking. Lean manufacturing breaks the rules of mass production, and so the traditional accounting and management methods are (at best) unsuitable and usually actively hostile to the lean changes the company is making.

(e) **Value Engineering :** Value engineering is an organized / systematic approach directed at analyzing the function of systems, equipment, facilities, services, and supplies for the purpose of achieving their essential functions at the lowest life-cycle cost consistent with required performance reliability, quality and safety. Society of Japanese Value Engineering defines VE as:

"A systematic approach to analyzing functional requirements of products or services for the purposes of achieving the essential functions at the lowest total cost".

Value Engineering is an effective problem solving technique. Value engineering is essentially a process which uses function analysis, team-work and creativity to improve value. Value Engineering is not just "good engineering". It is not a suggestion program and it is not routine project or plan review. It is not typical cost reduction in that it doesn't "cheapen" the product or service, nor does it "cut corners".