FINAL EXAMINATION
Syllabus 2016

Paper 15: STRATEGIC COST MANAGEMENT – DECISION MAKING (SCMD)

Time Allowed: 3 Hours **Full Marks: 100**

There are Sections A, B, C and D to be answered subject to instructions given against each.

Section A **You are required to answer all the questions. Each question carries 1 mark.** **Instructions: Each question is followed by 4 Answer choices and only one is correct. You are required to select the choice which according to you represents the correct answer.**					**20 X 1 = 20 Marks**
1.	**a.**	Company B uses a throughput accounting system. The details of product X per unit are as follows: Selling Price is Rs. 50 Material Cost is Rs. 16 Conversion Costs is Rs. 20 Time on bottle neck resource is 8 minutes What is the return per hour for product X?			
		(i)	Rs.105		
		(ii)	Rs.225	A	
		(iii)	Rs.255		
		(iv)	Rs.375		
	b.	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			
		(i)	Forensic Accounting	A	
		(ii)	Back-flush Accounting		
		(iii)	Tax Accounting		
		(iv)	Lean Accounting		
	c.	Life Cycle Cost considers_____.			
		(i)	Cradle to grave cost	A	
		(ii)	Only Future Cost		
		(iii)	Only present cost		
		(iv)	None of the above		
	d.	Back-Flush costing is most likely to be used when:			
		(i)	Management desires sequential tracking of costs		
		(ii)	A Just-in-time inventory philosophy has been adopted	A	
		(iii)	The company carries significant amount of inventory		
		(iv)	Actual production costs are debited to work-in-progress		
	e.	T Ltd. manufactures 4 products W, X, Y and Z with sales value mix of 33⅓%, 41⅔%, 16⅔% & 8⅓% and variable cost of 60%, 68%, 80% and 40% of selling price respectively, Budgeted sale value is Rs. 60,000. Overall P/V ratio is:			
		(i)	40%		

		(ii)	35%	A	
		(iii)	37%		
		(iv)	32%		
	f.	T Ltd. has earned a net profit of Rs.1 lakh, and its overall P/V ratio and Margin of safety are 25% and 50% respectively. What is the total fixed cost of the company ?			
		(i)	Rs.25,000		
		(ii)	Rs.50,000		
		(iii)	Rs.1,00,000	A	
		(iv)	Rs.2,00,000		
	g.	H Ltd. uses JIT and back flush accounting. It does not use a raw material stock control account. During March 2022, 10,000 units were produced and sold. The standard cost per unit is Rs. 150 which includes materials of Rs. 60. During March 2022, Rs. 9,90,000 of conversion costs were incurred. What would be the debit balance in cost of goods sold account for March 2022?			
		(i)	Rs.14,00,000		
		(ii)	Rs.14,80,000		
		(iii)	Rs.15,90,000	A	
		(iv)	Rs.16,20,000		
	h.	The following tasks are associated with ABC System: A. Allocation of Costs to products B. Identification of cost pools C. Identification of cost drivers D. Calculation of pool rates The proper order of the preceding tasks is:			
		(i)	C,B,D,A	A	
		(ii)	A,B,C,D		
		(iii)	C,D,B,A		
		(iv)	D,C,B,A		
	i.	H Group has two divisions, Division P and Division Q. Division P manufactures an item that is transferred to Division Q. The item has no external market and 6000 units produced are transferred internally each year. The costs of each division are as follows?			

Particulars	Division P	Division Q
Variable Cost	Rs. 100 per unit	Rs. 120 per unit
Fixed cost each year	Rs. 1,20,000	Rs. 90,000

			Head Office management decided that a transfer price should be set that provides a profit of Rs. 30,000 to Division P. What should be the transfer price per unit?		
		(i)	Rs. 145		
		(ii)	Rs. 125	A	
		(iii)	Rs. 120		
		(iv)	Rs. 135		
	j.	The higher the actual hours worked _____.			
		(i)	The lower the capacity usage ratio.		

		(ii)	The higher the capacity usage ratio		
		(iii)	The lower the capacity utilization ratio.		
		(iv)	The higher the capacity utilization ratio.	A	
	k.	Six Sigma has two key methodologies. These are:			
		(i)	DMACI and DMIADV		
		(ii)	DMACI and DMAIDV		
		(iii)	DMAIC and DMAIDV		
		(iv)	DMAIC and DMIADV	A	
	l.	A company makes components and sells internally to its subsidiary and also to external market. The external market price is Rs.24 per component, which gives a contribution of 40% of sales. For external sales, variable cost includes Rs.1.50 per unit for distribution costs. This is, however not incurred in internal sales. There are no capacity constraints. To maximize company profit, the transfer price to subsidiary should be:			
		(i)	Rs.9.60		
		(ii)	Rs.12.90	A	
		(iii)	Rs.14.40		
		(iv)	None of the above		
	m.	Which of the following would decrease unit contribution margin the most?			
		(i)	15% decrease in selling price	A	
		(ii)	15% increase in variable costs		
		(iii)	15% decrease in variable costs		
		(iv)	15% decrease in fixed costs		
	n.	What is the opportunity cost of making a component part in a factory given no alternative use of the capacity?			
		(i)	The variable manufacturing cost of the component		
		(ii)	The total manufacturing cost of the component) The total manufacturing cost of the component		
		(iii)	The total variable cost of the component		
		(iv)	Zero	A	
	o.	Learning curve theory is based on the idea that _____.			
		(i)	maximum efficiency can be achieved in the beginning		
		(ii)	maximum efficiency cannot be achieved in the beginning	A	
		(iii)	maximum efficiency cannot be achieved		
		(iv)	None of the above		
	p.	Linear Programming is a technique for _____.			
		(i)	optimization	A	
		(ii)	minimization		
		(iii)	maximization		
		(iv)	None of the above		
	q.	S Ltd. manufactures a product whose time for the first unit is 1000 hours. It experience a learning			

		curve of 80%, What will be the total time taken in hours for unit 5 to 8?			
		(i)	4096 hours		
		(ii)	3200 hours		
		(iii)	1536 hours	A	
		(iv)	2000 hours		
	r.	Simulation is _____.			
		(i)	an analysis & modeling tool	A	
		(ii)	manufacturing system		
		(iii)	quality control mechanism		
		(iv)	None of these		
	s.	In Learning Curve theory, relationship between labour cost per unit and cumulative production are _____.			
		(i)	Directly proportional		
		(ii)	Inversely proportional	A	
		(iii)	No relationship at all		
		(iv)	None of the above		
	t.	Which of the following is not a type of simulation?			
		(i)	Behavioral simulation		
		(ii)	Functional simulation		
		(iii)	Pareto Analysis	A	
		(iv)	Static timing analysis		
Section B **You are required to answer all the questions. Each question carries 2 marks.** **Instructions: Each question is followed by a space where you are required to type your answer.**					**10 X 2 = 20 Marks**
2.	**a.**	A company has the capacity of producing 80,000 units and presently sells 20,000 units at Rs. 100 each. The demand is sensitive to selling price and it has been observed that with every reduction of Rs. 10 in selling price the demand is doubled. What should be the target cost in selling price if the demand is doubled at full capacity and profit margin on sale is taken at 25%?			
		Type your answer here Rs. 60			
	b.	DBB Ltd. produces and sells a product. The company expects the following revenues and costs in 2021: Revenues (400 sets sold @ Rs.600 per product) Rs. 2,40,000 Variable costs Rs.1,60,000 Fixed costs Rs.50,000 What amount of sales must DBB Ltd. have to earn a target net income of Rs. 63,000 if they have a tax rate of 30%?			
		Type your answer here Rs.4,20,000			
	c.	The P/V ratio of a firm dealing in Electrical equipment is 50% and the margin of safety is 40%. What will be the BEP of the firm at a sales volume of Rs. 50,00,000?			

Type your answer here
Rs. 30,00,000

d. PK Ltd. uses standard cost system. The following information pertains to direct labour for Product X for the month of March, 2021:
Standard rate per hour Rs. 8
Actual rate per hour Rs. 8.40
Standard hours allowed for actual production 2000 hours
Labour Efficiency variance Rs. 1,600 (Adverse)
What were the actual hours worked?

Type your answer here
2200 hours

e. The information relating to the direct material cost of a company is as follows:
Standard price per unit Rs. 7.20
Actual quantity purchased in units 1600
Standard quantity allowed for actual production in units 1450
Material price variance on purchase (Favourable) Rs. 480
What is the actual purchase price per unit?

Type your answer here
Rs.6.90 per unit

f. S 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 2022-23 appears as under:

	Rs.
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%

What will be the Transfer price for division X?

Type your answer here
Rs. 12.70

g. A company manufactures and sells packaging machines. It recently introduced activity-based costing to refine its existing system. Each packaging machine requires direct materials costs of Rs. 50,000; 50 equipment parts; 12 machine hours; 15 assembly line hours and 4 inspection hours. The details about the cost pools, allocation bases and allocation rates are given below:

Indirect cost pool	Cost allocation base	Budgeted allocation rate
Material handling	No. of component parts	Rs. 8 per part

Machining	Machine hours	Rs. 68 per machine hour	
Assembly	Assembly line hours	Rs. 75 per assembly hour	
Inspection	Inspection hours	Rs. 104 per inspection hour	

The company has received an order for 40 can-packaging machines from a customer. Using activity-based costing, what will be the indirect costs allocated to the order of the customer?

Type your answer here

Rs. 1,10,280

h. An operation has a 90% learning curve and the first unit produced took 28 minutes. The labour cost is Rs. 20 per hour. How much should the second unit cost?

Type your answer here

Rs. 53.09

i. What is interfering float in the context of critical path analysis?

Type your answer here

Interfering float is that part of the total float which causes a reduction in the float of the successor activities. It is the difference between the latest finish time of the activity in question and the earliest starting time of the following activity or zero, whichever is larger.

j. In a PERT network, the optimistic time for a particular activity is 9 weeks and the pessimistic time is 21 weeks. What is the standard deviation for the activity?

Type your answer here

21-9)/6=2 weeks

Section C

You are required to answer any 4 out of 6 questions in this section.

Instructions: Each question is followed by a space where you are required to type your answer.

12 X 4 = 48 Marks

3. a. Z Ltd. manufacturers tablet batteries. The company is preparing a product life cycle budget for a new type of battery. Development on the new battery is to start shortly. Estimates for the new battery are as follows:

Life cycle units manufactured and sold	2,00,000
Selling price per battery	Rs. 55
Life cycle costs:	
R&D and Design cost	Rs. 8,00,000
Manufacturing:	
Variable cost per battery	Rs. 25
Variable cost per batch	Rs. 300
Battery per batch	250
Fixed costs	Rs. 12,00,000
Marketing	
Variable cost per battery	Rs. 3.50
Fixed costs	Rs. 8,00,000
Distribution:	
Variable cost per battery	Rs. 140
Battery per batch	100
Fixed costs	Rs. 4,60,000
Customer service cost per battery (Variable)	Rs. 1.70

		Ignore the time value of money.	
	(i)	What is the Estimate of Total Cost, Revenue and Operating Income?	7
		Type your answer here Estimated Total Cost = Rs.98,20,000 Estimated Revenue = Rs. 11,00,000 Estimated Operating Income = Rs.11,80,000 **ROUGH WORK**	

Statement of Budgeted Life Cycle Revenue and Cost

Particulars	Rs.	Rs.
Pre-manufacturing Costs:		
R&D and Design Cost	8,00,000	
		8,00,000
Manufacturing Costs:		
Variable Cost of Battery (25 × 2,00,000)	50,00,000	
Variable Cost of Batches (300 × 2,00,000/250)	2,40,000	
Fixed Cost	12,00,000	
		64,40,000
Marketing Costs:		
Variable Costs of Battery (3.5 × 2,00,000)	7,00,000	
Fixed Cost	8,00,000	
		15,00,000
Distribution Costs:		
Variable Cost (140 × 2,00,000/100)	2,80,000	
Fixed Cost	4,60,000	
		7,40,000
Customer Service Costs:		
Variable Cost (1.7 × 2,00,000)	3,40,000	
		3,40,000
Estimated Total Cost		98,20,000
Estimated Operating Income (Balancing Figure)		11,80,000
Estimated Revenue (55 x 2,00,000)		1,10,00,000

	(ii)	Express the R&D design cost as a percentage of total product life cycle?	3

Type your answer here

8.14%

ROUGH WORK

Budgeted product life cycle costs for R&D and design	Rs. 8,00,000
Total budgeted life cycle product costs	Rs. 98,20,000
Percentage of budgeted product life cycle cost incurred	
Till the R&D and design	Rs. 8,00,000/98,20,000 = 8.14%

b. What is Kaizen Costing? 2

Type your answer here

Kaizen Costing refers to the ongoing continuous improvement program that focuses on the reduction of waste in the production process, thereby further lowering costs below the initial targets specified during the design phase. It is a Japanese term for a number of cost reduction steps that can be used subsequent to issuing a new product design to the factory floor.

4. a. X Ltd. manufactures and sells a special component. It follows a Standard Marginal Costing system. For the year ended 31.03.2021, it produced 1500 components against a budgeted capacity of 2000 components. Out of the production 100 components were scrapped. Due to a computer virus most of the financials could not be retrieved. However, the Chief Cost Accountant gave the following information:

Particulars	Rs.
Selling Price per component	213
Direct materials total cost	84,000
Direct labour cost per component (Actual efficiency 80%)	?
Variable Manufacturing overhead per component	15
Variable Selling overhead per component	8
Fixed Selling and Administration overheads	48,000
Fixed overhead manufacturing absorption rate per component (on the basis of budgeted capacity)	30
Closing stock (200 units) (Valued at prime cost for financial purpose)	18,000

(i) What is the difference between the profit as per marginal costing and absorption costing? 8

Type your answer here

Difference = 21000-12,000=Rs.9,000

ROUGH WORK

(1) Fixed Manufacturing Overheads = 60,000

Budgeted Capacity × Absorption Rate (2000×30)

Fixed administrative Overheads = 48,000

Total Fixed cost = 108,000

(2) Contribution per Unit

Selling	213
Less: Price Prime Cost (Material + Labour)(18000/200)	(90)
Less: Variable Manufacturing Overhead	(15)
Less: Variable Selling Overhead	(8)
Contribution/Unit	100

(3) Break Even volume (108000/100 Units) = 1,080 Units

(4) Total Absorption Cost / Unit (60+30+15) = 105
(Materials + Labour + Variable Manufacturing OH)

Profit under Marginal Costing: Contribution (1200×100) =	1,20,000
Less: Fixed Cost	1,08,000
Profit under Marginal Costing	12,000

Particulars	Profit under Absorption Costing
Sales (1200 Units × Rs.213)	255,600
Production (1500 Units × Rs.105)	202,500
Additional Labour cost	-
Less: Closing Stock (200 units x 135 p.u.) (18000 given in the question)	27,000
Less: Scrap 100 units x 135	13500
Add: Under absorption of OH (500×30)	15,000
Add: Manufacturing Fixed OH	-
Total Cost of Manufacture	177,000
Gross Profit	78,600
Less: Fixed Administrative OH	48,000
Less: Variable Selling OH	9,600
Profit/(Loss)	21,000

(ii) What is the margin of safety under current sales? 2

Type your answer here

Margin of Safety= Rs.12,000

ROUGH WORK

Margin of Safety= Sales- Break even sales x C/unit

=1,200(1,500-100-200)

= (1,200-1,080)100 =Rs.12,000

b. What is out of pocket costs? 2

Type your answer here

This is the portion of the cost associated with an activity that involve cash payment to other parties, as opposed to costs which do not require any cash outlay, such as depreciation and certain allocated costs. Out-of-Pocket Costs are very much relevant in the consideration of price fixation during trade recession or when a make-or-buy decision is to be made.

5. a. A Company manufactures two products X and Y. Product X requires 8 hours to produce while Y requires 12 hours. In April, 2021, out of 22 effective working days of 8 hours a day. 1,200 units of X and 800 units of Y were produced. The company employs 100 workers in production department to produce X and Y. The budgeted hours are 1, 86,000 for the year. What is the activity ratio and how is it related to efficiency and capacity? 6

Type your answer here

Capacity Ratio= 113.55%

Efficiency Ratio = 109.09%

Activity Ratio = 123.87%

ROUGH WORK

Capacity Ratio = Actual Hours Worked /Budgeted hours p.m. × 100

= 17,600 100 15,500 × = 113.55%

Efficiency Ratio = Standard hours of production / Actual Hours Worked ×100

= 19,200 100 15,500 × = 109.09%

Activity Ratio = Standard hours of production / Budgeted hours p.m. ×100

= 19,200 100 15,500 × = 123.87%

Particulars	Workings	Hours
Standard hours of production		
Product X	(1,200 units x 8 hrs.)	9,600
Product Y	(800 units x 12 hrs.)	9,600
Total standard hours		19,200
Actual hours worked	(100 workers x 8 hrs. x 22 days)	19,200
Budgeted hours per month	(1,86,000 hrs./12 months)	15,500

b. G Ltd. is engaged in marketing of wide range of consumer goods. A, B and C are the zonal sales officers for four zones. The company fixes annual sales target for them individually. You are furnished with the following: 6

The standard costs of sales target in respect of A, B and C are Rs. 5,00,000, Rs. 3,75,000, Rs. 4,00,000 respectively.

A, B and C respectively earned Rs. 29,900, Rs. 23,500, and Rs. 24,500 as commission at 5% on actual sales effected by them during the previous year.

The relevant variances as computed by a qualified Cost Accountant are as follows:

	A	B	C
Sales Price Variance	4000(F)	6000(A)	5000(A)
Sales Volume Variance	6000(A)	6000(F	15000(F)

Adverse Variance (A) and Favourable Variance (F)

What is the amount of target sales and margin fixed in case of each of the zonal sales officers?

Type your answer here

Budgeted Sales
A = Rs.6,00,000
B = Rs.4,70,000
C = Rs.4,80,000
Budgeted Margin:
A = Rs.1,00,000
B = Rs. 95,000
C= Rs.4,80,000

ROUGH WORK

	A	B	C
Actual Sale	5,98,000 (29900/5%)	4,70,000 (23500/5%)	95,000 (470000 - 375000
Sales Value Variance	2000A (6000A - 4000F)	0 (6000F - 6000A)	10000F (15000F - 5000A)
Budgeted Sales	6,00,000 (5,98,000 - 2000A)	4,70,000 (470000 - 0)	4,80,000 (4,90,000 -10,000)
Budgeted Margin	1,00,000 (600000 - 500000)	95,000 (470000 - 375000	4,80,000 (4,90,000 -10,000)

6. **a.** The budgeted overheads and cost driver volumes of XYZ are as follows:

Cost Pool	Budgeted Overheads (Rs.)	Cost Driver	Budgeted Volume
Material procurement	6,75,000	No. of orders	950
Material handling	1,80,000	No. of movements	540
Set-up	4,25,000	No. of set ups	550
Maintenance	8,95,000	Maintenance hours	7,500
Quality control	2,76,000	No. of inspection	990
Machinery	7,20,000	No. of machine hours	24,000

The company has produced a batch of 3,200 components of SK-15, its material cost was Rs.170,000 and labor cost Rs.2,70,000. The usage activities of the said batch are as follows.
Material orders – 29, maintenance hours – 685, material movements – 21, inspection – 32, set ups – 26, machine hours – 1,770

(i) Calculate the cost driver rates that are used for tracing appropriate amount of overheads to the said batch. 3

Type your answer here

Material procurement 711
Material handing 333
Set-up 773
Maintenance 119
Quality control 279
Machinery 30

ROUGH WORK

Computation of Cost Driver Rates

Particulars	Workings	Cost Driver Rates
Material Procurement	675000/950	711

Material Handing	180000/540	333
Set-up	425000/550	773
Maintenance	895000/7500	119
Quality Control	276000/990	279
Machinery	720000/24000	30

(ii) Ascertain the cost of batch of components using Activity Based Costing. 3

Type your answer here

Batch Cost=Rs. 6,31,253

ROUGH WORK

Computation of Batch Cost of 3200 units of SK-15

Particulars	Amount (Rs.)	Amount (Rs.)
Material Cost		1,70,000
Labour Cost		2,70,000
Prime Cost		4,40,000
Add: Overheads		
Material Orders (29 x 711)	20,619	
Material Handling (21 x 333)	6,993	
Set-up (26 x 773)	20,098	
Maintenance (685 x 119)	81,515	
Quality Control (32 x 279)	8,928	
Machinery (1,770 x 30)	53,100	
Total Cost		6,31,253

b. The manager of an oil refinery must decide on the optimum mix of 2 possible blending processes of which the input and output production runs are as follows:

	Input		Output	
Process	Crude A	Crude B	Gasoline X	Gasoline Y
1	6	4	6	9
2	5	6	5	5

The maximum amount available of crude A and B are 250 units and 200 units respectively. Market demand shows that at least 150 units of gasoline X and 130 units of gasoline Y must be produced. The profits per production run from process 1 and process 2 are Rs. 4 and Rs. 5 respectively.

(i) Applying Linear Programming, formulate the objective function. 3

Type your answer here

The objective function is to Maximize $Z = 4x_1 + 5x_2$

(ii) What are the constraints in the LP Formulation? 3

Type your answer here

Subject to constraints:

(i) $6x_1 + 5x_2 \leq 250$ (Available Crude A)

(ii) $4x_1 + 6x_2 \leq 200$ (Available Crude B)

(iii) $6x_1 + 5x_2 \geq 150$ (Demand of gasoline X)

(iv) $9x_1 + 5x_2 \geq 130$ (Demand of gasoline Y)

(v) $x_1, x_2 \geq 0$ (Non-negativity restrictions)

7. a. Given the following information regarding a project and the time duration of each activity:

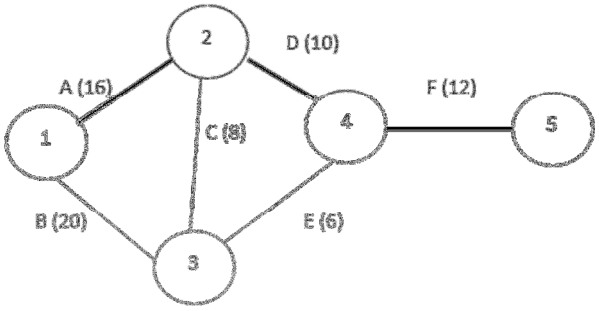
Activity	Preceding Activity	Normal Time (days)
A	-	16
B	-	20
C	A	8
D	A	10
E	B,C	6
F	D,E	12

(i) Identify the critical activity of the project. 3

Type your answer here

Critical Path=A – C – E – F = 16 + 8 + 6 + 12 = 42 days

ROUGH WORK



A – C – E – F = 16 + 8 + 6 + 12 = 42

A – D – F = 16 +10 + 12 = 38

B – E – F = 20 + 6 + 12 = 38

(ii) Find the total float and free-float for each activity. 5

Type your answer here

Total Float: 0-4-0-4-0-0

Free Float: 0-4-0-4-0-0

ROUGH WORK

Total float and free float for each activity

Activity	Normal time (Days)	EST	EFT	LST	LFT	Total Float	Free Float
A	16	0	16	0	16	0	0
B	20	0	20	4	24	4	4
C	8	16	24	16	24	0	0
D	10	16	26	20	30	4	4
E	6	24	30	24	30	0	0
F	12	30	42	30	42	0	0

b. The following was the pattern for demand of cars rented out by a tourist operator observed for 100 days : — 4

No. of cars	5	7	10	15
No. of days	20	30	40	10

The random numbers are 88, 76, 10, 05, 23
Simulate the demand for cars over five days.

Type your answer here

For 75% or more probability, we need more than 3 days when demand is fulfilled i.e. 3/5 = 60%. Therefore at least 4 days' demand is fulfilled.

ROUGH WORK

No. of cars	No. of Days	Probability	Cumulative Probability	Random No. Interval	Day	Random No.	Demand
5	20	0.20	0.20	00-19	1	88	10
7	30	0.30	0.50	20-49	2	76	10
10	40	0.40	0.90	50-89	3	10	5
15	10	0.10	1.00	90-99	4	05	5
					5	23	7

8. **You are required write Short Notes on any 4 out of 5 questions.** — **4 X 3 = 12 Marks**

a. Importance of Product Life Cycle Costing (Any 3) — 3

Type your answer here

Product Life Cycle Costing is considered important due to the following reasons

(i) Time based analysis: Life cycle costing involves tracing of costs and revenues of each product over several calendar periods throughout their life cycle. Costs and revenues can analysed by time periods. The total magnitude of costs for each individual product can be reported and compared with product revenues generated in various time periods.

(ii) Overall Cost Analysis: Production Costs are accounted and recognized by the routine accounting system. However non-production costs like R&D; design; marketing; distribution; customer service etc. are less visible on a product — by — product basis. Product Life Cycle Costing focuses on recognizing both production and non-production costs.

(iii) Pre-production costs analysis: The development period of R&D and design is long and costly. A high percentage of total product costs may be incurred before commercial production begin. Hence; the Company needs accurate information on such costs for deciding whether to continue with the R&D or not.

(iv) Pre-production costs analysis: The development period of R&D and design is long and costly. A high percentage of total product costs may be incurred before commercial production begin. Hence; the Company needs accurate information on such costs for deciding whether to continue with the R&D or not.

(v) Better Decision Making: Based on a more accurate and realistic assessment of revenues and costs, at least within a particular life cycle stage, better decisions can be taken.

(vi) Long Run Holistic view: Product Life Cycle Costing can promote long-term rewarding in contrast to short-term profitability rewarding. It provides an overall framework for considering total incremental costs over the entire life span of a product, which in turn facilitates analysis of parts of

		the whole where cost effectiveness might be improved. (vii) Life Cycle Budgeting: Life Cycle Budgeting, i.e., Life Cycle Costing with Target Costing principles, facilitates scope for cost reduction at the design stage itself. Since costs are avoided before they are committed or locked in the Company is benefited. (viii) Review: Life Cycle Costing provides scope for analysis of long term picture of product line profitability, feedback on the effectiveness of life cycle planning and cost data to clarify the economic impact of alternatives chosen in the design, engineering phase etc.	
	b.	Learning Curve Theory	3
		Type your answer Learning Curve Theory is concerned with the idea that when a new job, process or activity commences for the first time, it is likely that the workforce involved will not achieve maximum efficiency immediately. Repetition of the task is likely to make the people more confident and knowledgeable and will eventually result in a more efficient and rapid operation. Eventually the learning process will stop after continually repeating the job. As a consequence the time to complete a task will initially decline and then stabilize once efficient working is achieved. The cumulative average time per unit is assumed to decrease by a constant percentage every time that output doubles. Cumulative average time refers to the average time per unit for all units produced so far, from and including the first one made.	
	c.	Fixed Overhead Volume Variance	3
		Type your answer Fixed overhead volume variance is the difference between standard costs of fixed overhead allowed for actual output and the budgeted fixed overheads for the period. This variance shows the over (or) under absorption of fixed overheads during a particular period. If the actual output is more than the budgeted output then there will be over recovery of fixed overheads and volume variance will be favorable and vice-versa.	
	d.	Usefulness of Pareto analysis (Any 3)	3
		Type your answer 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.	
	e.	Assignment	3
		Type your answer Assignment is a special linear programming problem. There are many situations where the assignment of people or machines etc. may be called for. Assignment of workers to machines, clerks to various check-out counters, salesmen to different sales areas are typical examples of these. The Assignment is a problem because people possess varying abilities for performing different jobs and therefore the costs of performing jobs by different people are different. Thus, in an assignment problem, the question is how the assignments should be made in order that the total cost involved	

		is minimized.	
		Section D **You are required to answer all the questions in this section.** **Instructions: Each question is followed by a space where you are required to type your answer.**	**12 Marks**
9.		Demand for two-wheelers has gained pace since the easing of Covid-induced curbs by state governments and the momentum is expected to continue well into the festive season, said a top executive at one of the largest automobile manufacturers in the country. In the country, two-wheelers primarily include motorcycles, mopeds, scooters and electric two wheelers. Some of the key factors driving the demand of two wheelers in India include its ease of maneuvering through congested roads, lower carbon emissions, higher fuel efficiency, and providing an economical mode of transportation in comparison to three or four wheeled vehicles. Furthermore, rising urbanization, improving road infrastructure, and increasing number of women consumers are also catalyzing the demand of two wheelers in India. The market, however, faces some challenges as well. Increasing work from home practice, which does not require people to commute to work may negatively impact demand over the next few years. Furthermore, increasing petrol prices in the country may also act as a constraint for market growth, particularly, in the entry level price sensitive category. Overall, it is expected that the two-wheeler market is to revive from 2021 onwards and exhibit moderate growth during 2021-2026. Vehicle's exhaust system is designed to take care of toxic emissions automobiles produces. It will direct harmful hydrocarbons away from the driver and passengers, and reduce the air pollutants automobiles releases into the environment, helping keep the air clean. An additional benefit is that the exhaust system significantly reduces the amount of noise automobiles produce. An exhaust system in working order will keep automobiles sounding pleasant as it runs and will reduce noxious gases. Motorcycle exhaust system also known as muffler is made to route exhaust gases away from the engine. As fuel burn inside the engine gases and fumes are produced, so this gases and fumes need to be taken out from the engine. The exhaust system does the work. The muffler also captures some of the harmful toxins in the gases before they are released into the atmosphere. It also helps regulating engine noise. Some are made to create specific sounds to certain motorcycles. Silencer has to muffle the vibrations of the exhaust gases, reduce their velocity and thus reduce the amount of noise emitted from the engines. The pulsating low from each cylinder's exhaust process of an automobile petrol or diesel engine sets up pressure waves in the exhaust system-the exhaust port and the manifold having average pressure levels higher than the atmospheric. This varies with the engine speed and load. At higher speeds and loads the exhaust manifold is at pressures substantially above atmospheric pressure. These pressure waves propagate at speed of the sound relative to the moving exhaust gas, which escapes with a high velocity producing an objectionable exhaust boom or noise. A suitably designed exhaust silencer accomplishes the muffling of this exhaust noise. Which means that the exhaust gases from an internal-combustion engine are passed to attenuate (reduce) the airborne noise of the engine. To be efficient as a sound reducer, a muffler must decrease the velocity of the exhaust gases and either absorbs sound waves or cancel them by interference with reflected waves coming from the same source. A typical sound absorbing material used in a muffler is a thick layer of fine fibers, the fibers are caused to vibrate by the sound waves, thus converting the sound energy into heat. Mufflers that attenuate sound waves by interference are known as reactive mufflers. These devices generally separate the waves into two components that follow different paths and then come	

together again out of phase (out of step), thus cancelling each other out and reducing the sound.
the trends for the two-wheeler segment in India:

Particulars	Costs per unit	Total for 10,000 units
Direct Materials	4.00	40,000
Direct Manufacturing Labour	2.00	20,000
Power and Utilities (variable)	1.50	15,000
Inspection, Set-Up and Materials Handling		2,000
Machine Rent		3,000
Allocated Fixed Costs of Plant Administration, Insurance,etc.		30,000
Total Costs		1,10,000

MNC received an offer from an outside vendor for the supply of any number of mufflers at Rs.8.20 per Muffler. The following additional information is available on MNC's operations –

• Inspection, Set-up and Materials Handling Costs vary with the number of batches in which the Mufflers are produced. MNC currently produces the Mufflers in batches of 1000 units. It estimates that 10 batches are required for meeting the expected production requirements.

• MNC rents the machine used to make the Mufflers. If it chooses to outsource the Mufflers, machine rent can be avoided.

a. Should MNC accept the Vendor's offer for 10,000 units? What is the maximum price payable to the Vendor? 3

Type your answer

Decision: Since Cost of Buying Rs. 8.20 p.u. is higher than Average Relevant Cost Rs. 8, own production is preferable. Hence, the Company should not accept the Vendor's offer.

Maximum Price Payable = Relevant Cost = Rs. 8.00 per unit.

ROUGH WORK

Computation of Relevant Costs of own production

Particulars	Nature and Computation	Rs.
Direct Materials	Variable and Relevant = Rs.4 x 10,000	40,000
Direct Manufacturing labour	Variable and Relevant = 2 × 10,000 Variable	20,000
Power and Utilities	and Relevant = 1.50 × 10,000 Batch Related	15,000
Inspection, Set up etc.	Production Costs= Specific and Relevant	2,000
Machine Rent	(given) Specifically incurred = relevant	3,000
Fixed Costs	Allocated and Irrelevant	Nil
Total Relevant Costs for own production		80,000

Average Relevant Cost per unit for own production = (Rs. 80,000/10,000) = Rs. 8 per unit

b. Suppose the Mufflers were purchased from outside, the facilities where the Mufflers are currently made will be used to upgrade the bicycles by adding Mud Flaps and Reflectors. As a result, the Selling Price of the Bicycles can be increased marginally by Rs. 20. The Variable costs of the upgrade would be 18 and additional Tooling Costs of Rs. 16,000 would be incurred. Should MNC make or buy the Mufflers, at the anticipated production level of 10,000 units and why? 3

Type your answer here

Cost of Buying Rs. 8.20 p.u. is less than Average Relevant Cost Rs. 8.40. Hence, buying the mufflers is preferable now.

ROUGH WORK

Effect of Alternative use of facilities:

		Additional Benefit from upgradation = 10,000 units x (Rs.20 - 18) = Rs.20,000 Less: Fixed Costs incurred specifically = Rs.16,000 Net Additional Benefit = Rs.4,000 Since this benefit will be foregone due to own production of Mufflers, the relevant cost of own production will then be 80,000 (as per WN 1) + Rs.4,000 (Opportunity Cost) = Rs. 84,000. Average Relevant Cost per unit for own production = Rs. 84,000/10,000 units = Rs. 8.40 per unit	
	c.	What is the maximum price payable to the Vendor in the situation of (b)?	2
		Type your answer here Maximum Price Payable = Relevant Cost = Rs. 8.40 per unit.	
	d.	MNC's Sales Manager is concerned that the estimate of 10,000 units may be high and believes that only 6,200 units can be sold. Production will be cut back, freeing up work facilities and space. This space can be used to add the Mud Flaps and Reflectors whether MNC outsources the Mufflers or makes them in-house. At this lower output, MNC will produce the mufflers in 8 batches of 775 units each. Should MNC purchase the Mufflers from the Outside Vendor?	4
		Type your answer here Since Cost of Buying Rs. 8.20 p.u. is less than Average Relevant Cost Rs. 8.24, buying the mufflers is preferable. Maximum Price Payable = Relevant Cost = Rs. 8.24 per unit Buying the mufflers is preferable. **ROUGH WORK** Computation of Relevant Costs of Own Production, with Revision in Production Estimates	

Particulars	Nature and Computation	Rs.
Direct Materials	Variable and Relevant = Rs. 4 x 6,200 units	24,800
Direct Manufacturing labour	Variable and Relevant = Rs. 2 x 6,200 units	12,400
Power and Utilities	Variable and Relevant = Rs. 1.50 × 6,200	9,300
Inspection, Set-up, etc.	units Batch Related Costs = (2,000 + 10 batches)× 8 batches	1,600
Machine Rent	Specifically incurred = relevant	3,000
Fixed Costs	Allocated and Irrelevant	Nil
Total Relevant Costs for own production		51,100

Average Cost per unit for own production = (Rs. 51,100/6,200 units) = Rs. 8.24 per unit

END