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Answer Paper	
SCMPE	Duration: 65
Details: Test – 3	Marks: 35

Instructions:

- All the questions are compulsory
- Properly mention test number and page number on your answer sheet, Try to upload sheets in arranged manner.
- In case of multiple choice questions, mention option number only Working notes are compulsory wherever required in support of your solution
- Do not copy any solution from any material. Attempt as much as you know to fairly judge your performance.

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ANS 1:-

(i) Variable cost per unit that will be affected by learning and experience curve is Rs. 2,200 (Rs. 4,400 – 50%of Rs. 4,400).

Let 'r' be the learning curve rate.

No. of batch (x)	Cumulative Average Cost per unit (y)
1	2,200
2	$2,200 r$
4	$2,200 r^2$

If $2,200 r^2 = \text{Rs. } 1,920$ (Rs. 4,120 – 50% of Rs. 4,400)

$$r^2 = 0.8727$$

$$r = 0.934$$

Therefore, Learning Curve Effect = 93% (rounded off)

(ii) Calculation of Optimum Price

Price per unit (Rs.)	Demand (units)	Variable Cost per unit * [W.N.] (Rs.)	Variable cost per unit ** (Rs.)	Total Variable Cost per unit (Rs.)	Contribution per unit (Rs.)	Total Contribution (Rs.)
11,100.00	1,000	2,200.00	2,200.00	4,400.00	6,700.00	67,00,000
10,700.00	2,000	2,046.00	2,200.00	4,246.00	6,454.00	1,29,08,000

9,600.00	3,000	1960.86	2,200.00	4,160.86	5,439.14	1,63,17,420
8,700.00	4,000	1,902.78	2,200.00	4,102.78	4,597.22	1,83,88,880

(*) This represents variable cost part which is affected by the learning and experience curve effect.

(**) This represents variable cost part which is not affected by the learning and experience curve effect.

Working Note [W.N.] Variable Cost per unit

Output in Batches (x)	Average Cost of the First Unit (a)	$x^{-0.1047}$	Cummulative Average Cost per unit (y)
1	2,200	1.0000	2,200.00
2	2,200	0.9299	2,046.00
3	2,200	0.8913	1,960.86
4	2,200	0.8649	1,902.78

$$y = ax^b$$

Where,

y= Cummulative average unit costs

a= Average cost of the first unit

x= Cummulative number of batches

$$b = \text{Log of learning ratio} \div \text{Log of 2}$$

$$= \log 0.93 \div \log 2$$

$$= -0.0315 \div 0.3010$$

$$= -0.1047$$

ANS 2:-

As per the statement given in the problem, Flight GP-022 incurs a net (loss) of Rs. 158,100. This is the net result of revenue less costs. Revenue is entirely variable depending upon passenger occupancy. Costs are both variable and fixed nature. To analyze the impact of dropping flight GP-022, we need to re-compute net gain/(loss) that Golden Pacific earns when it operates the flight based on relevant costing principles.

Net Gain/(Loss) = Revenue earned from flight operations less Variable costs of operation

Revenue earned is the ticket revenue earned from flight operations of GP-02, this is entirely variable. Variable costs of flight operations are those expenses that would be incurred only when the flight is operated. These include variable expenses per passenger, salaries flight assistants, overnight costs for flight crew and assistants, fuel for aircraft, a third portion of flight insurance that is specifically related to this flight sector and flight promotion expense. These are expenses that will not be incurred if the flight is not operated. Hence, relevant for decision making.

Other expenses like salaries of flight crew and hanger parking fees for aircraft are fixed expenses that will be incurred even if the flight does not operate. Loading and flight preparation expenses is an allocated cost that will continue to be incurred even flight GP-022 does not operate. Depreciation of aircraft and liability insurance expense (2/3rd portion not related to a specific flight sector) are sunk costs. These expenses have already been incurred

and hence are irrelevant to decision making. Therefore, these fixed, allocated and sunk expenses are ignored while analyzing the decision whether to continue operating flight GP-022.

Flight GP-022 Statement Showing Net Gain/(Loss)		
	Rs	Rs.
Contribution Margin if the flight is continued		5,88,000
Less: Flight Costs		
Flight Promotion	28,000	
Fuel for Aircraft	2,38,000	
Liability Insurance ($1/3 \times \text{Rs. } 1,47,000$)	49,000	
Salaries, Flight Assistants	31,500	
Overnight Costs for Flight Crew and Assistants	12,600	3,59,100
Net Gain/ (Loss)		2,28,900

If Golden Pacific Airlines Ltd. discontinues flight GP-02, profits will reduce by Rs. 2,28,900/-. The statement showing loss in operations of Rs. 158,100 is misleading for decision making purpose because it accounts for costs that are fixed and irrelevant. However, since flight GP-022 yields a net gain of Rs. 2,28,900/-, flight operations should continue.

(5 Marks)

ANS 3:-

(i) Contribution Margin per unit			
Particulars	Super Grade (Rs.)	Good Grade (Rs.)	Normal Grade (Rs.)
Selling Price per unit	3,600	3,400	3,000
Less: Variable Conversion Cost per unit	1,200 (Rs. 100 × 12hrs.)	1,200 (Rs. 100 × 12hrs.)	1,000 (Rs. 100 × 10 hrs.)
Less: Direct Material Cost per unit	2,100	1,900	1,720
Contribution Margin per unit	300	300	280

(ii) The contribution margin per unit may give false signals when an organization has production bottlenecks. Instead, company should use the contribution margin per bottleneck hour to determine relative product profitability, as follows:

Particulars	Super Grade (Rs.)	Good Grade(Rs.)	Normal Grade(Rs.)
Contribution Margin per unit (Rs.)	300	300	280
Furnace Bottleneck hrs. per unit	6	5	4
Contribution Margin per furnace hour	50	60	70

Analysis

The Super and Good Grade steel have the highest contribution margin per unit (Rs. 300); however, the normal grade has the highest contribution margin per furnace hour (Rs. 70). Thus, using production bottleneck analysis indicates that the Normal Grade is actually more profitable at a Rs. 70 contribution margin per furnace hour than Super Grade's Rs. 50 or Good Grade's Rs. 60 contribution margin per furnace hour.

Therefore, the company would want to sell product in the following preference order:

- I. Normal Grade
- II. Good Grade
- III. Super Grade

(iii) One way is to revise the pricing would be to increase the price to the point where all three products profitability equal to the highest profit product. This would be determined as follows:

Contribution Margin per furnace hour for Normal Grade =

$$\frac{\text{Revised price of Super grade} - \text{Variable Cost per unit of Super Grade}}{\text{Furnace Hours of Super Grade per unit}}$$

Or

$$\text{Rs. 70} = \frac{\text{Revised price of Super Grade} - \text{Rs. (1,200 + 2,100)}}{6 \text{ hrs.}}$$

Or, Rs. 420 = Revised Price of Super Grade – Rs. 3300

Super Grade steel would require a revised price of Rs. 3,720 in order to deliver the same contribution margin per bottleneck hour as does Normal Grade steel.

Contribution Margin per furnace hour for Normal Grade =

$$\frac{\text{Revised price of Super grade} - \text{Variable Cost per unit of Super Grade}}{\text{Furnace Hours of Super Grade per unit}}$$

Or

$$\text{Rs. 70} = \frac{\text{Revised price of Super Grade} - \text{Rs.}(1,200+1,900)}{5 \text{ hrs.}}$$

Good grade steel would require a revised price of 3,450 in order to deliver the same contribution margin per bottleneck hour as does Normal grade steel.

(8 Marks)

ANS 4:-

Computation of labour and overhead rate				
Particulars	Core Making	Melting & pouring	Moulding	Cleaning & grinding
Labour & overheads (Rs.)	18,000.00	26,000.00	9,000.00	6,500.00
Labour & overheads per hour (Rs.)	9.00	6.50	6.00	5.20
No. of hours	2,000.00	4,000.00	1,500.00	1,250.00
Variable overhead per hour (Rs.)	1.50	0.25	0.67	0.80
Labour rate per hour (Rs.)	5.00	4.00	4.00	3.60
Hours required for new order	1,350.00	2,250.00	900.00	900.00
Labour cost required for order (Rs.)	6,750.00	9,000.00	3,600.00	3,240.00
Variable overhead cost for order (Rs.)	1,620.00	563.00	600.00	270.00

Revised monthly labour and overheads cost budget reflecting the additions of the order					
Particulars	Core making	Melting & pouring	Moulding	Cleaning & grinding	Total
	Rs.	Rs.	Rs.	Rs.	Rs.
Labour	10,000	16,000	6,000	4,500	
Labour for the order	6,750	9,000	3,600	3,240	
	16,750	25,000	9,600	7,740	
Variable overheads	3,000	1,000	1,000	1,000	
Variable overheads for the order	1,620	563	600	270	
	4,620	1,563	1,600	1,270	
Fixed cost	5,000	9,000	2,000	1,000	
Total	26,370	35,563	13,200	10,010	85,143
Add : additional fixed cost					1,000
Total					86,143

Computation of total price for the order (Amount in Rs.)		
Material	(15000x1)	15,000.00
Labour & overheads	(86143-59500)	26,643.00
		41,643.00

Total price for the order	(41643x6)	249,858.00
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(8 Marks)

ANS 5:-

(i) Calculation of area to be cultivated in respect of each crop to achieve the largest total profit

	Potatoes	Peas	Carrots	Tomatoes
Boxes per hectare	350	100	70	180
(a) Market price	Rs. 30.76	Rs. 31.74	Rs. 36.80	Rs. 44.55
(b) variable costs:				
Direct material	2.72*	4.32	5.49	3.47
Labour - Growing	5.12*	12.16	10.63	5.87
Harvesting & Packing	7.20	6.56	8.80	10.40
Transport per box	10.40	10.40	8.00	19.20
Total variable costs	25.44	33.44	32.92	38.94
(c) Contribution per box (a)-(b)	5.32	1.70	3.88	5.61
Contribution per hectare × Boxes per hectare (c)	1862	170	271.60	1009.80
Ranking	I	II	III	IV

*Cost per hectare ÷ Boxes per hectare

Land available for all four vegetables = 340 hectares

Land available for peas and carrots = 140

Total land available = 480

Min. requirement of each variety = 5000 boxes

Max. requirement of each variety= 113750 boxes

Best cultivation plan: From 140 hectares for peas and carrots:

Peas: Minimum 5000 boxes = $5000 \div 100 = 50$ hectares

Carrots: Balance land 140 hectares – 50 hectare = 90 hectares (equivalent to 6300 boxes)

From 340 hectares all four vegetables:

(Since ranking for Peas & carrots is lowest & has already been allocated 140 hectares, no further land shall be allotted to these two products)

Tomatoes: Minimum 5000 boxes = $5000 \div 180 = 28$ hectares (in terms of complete hectares)

Potatoes: Balance of land i.e. $340 - 28 = 312$ hectares (equivalent to 109200 boxes)

Area to be cultivated for each variety and total contribution

	Potatoes	Peas	Carrots	Tomatoes
Hectares	312	50	90	28
Contribution per hectares	Rs. 1862	170	271.60	1009.8
Contribution	Rs. 580944	8500	24444	28274.40

Total Contribution				Rs.625162.40
Less: Fixed expenses				424000.00
Profit				201162.40

(ii) Analysis to show whether land development should be undertaken

Carrot yield a lower contribution per hectare than Potatoes and Tomatoes, but it is grown in excess of the requirement of 5000 boxes or 72 hectares i.e. 5000 boxes/700. Therefore, 18 hectares i.e., 90 hectares – 72 hectares can be made available for Potatoes and Tomatoes by land improvement.

After land improvement the contribution per hectare of Tomatoes will be follows:

present contribution per hectare	Rs.1009.80
Saving per hectare after land improvement Rs. 2.60×180 boxes	460
	1477.8

Allocation of 18 hectares available					
Crop	Maximum Sales (Boxes)	Present Production (Boxes)	Addl. Req. (Boxes)	Yield per hectare (Boxes)	Additional hectares to be allotted
Potatoes	113750	109200*	4550	350	13
Tomatoes	113750	5000	900	180	5(B.F.)

*312 hectares × 350 boxes = 109200

Profit by revised Cultivation plan					
	Potatoes	Peas	Carrots	Tomatoes	Total
Hectares	325	50	72	33	480
Contribution per hectare	Rs.1862	170	271.60	1477.80	
Total contribution	Rs.605150	8500	19555.20	48767.40	664972.60
Less: Fixed cost (revised)*					440200.00
profit					2224772.60
*capital expenditure					18 hectares × 6000 = 108000
Interest (108000 × 0.15)					Rs. 16200
Existing fixed expenses					424000
					440200

Conclusion: Since the profit after land development is greater, the company should implement the proposal to develop 18 hectares of land.

(8 Marks)