Answer to PTP_Final_Syllabus 2008_Jun 2015_Set 2

Paper- 15: MANAGEMENT ACCOUNTING-ENTERPRISE PERFORMANCE MANAGEMENT

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

The figures in the margin on the right side indicate full marks.
Attempt Question No. 1 (carrying 25 marks), which is compulsory and
Any five questions (each carrying 15 marks) from the rest.

1.

(a) Fill in the blanks with the most appropriate words: [5×1=5]

(i) FAST or Function Analysis System Technique is an evolution of the _____ process.
(ii) Kaizen is a Japanese term comprising KAI = _____ and ZEN = _____.
(iii) Real-time communication is a possible function that can be enabled through the use of _____ tools.
(iv) _____ _____ is the demonstrated systematic tendency to be over-optimistic about key project.
(v) Enterprise Risk Management deals with _____ and _____ affecting value creation.

(b) Choose the most appropriate one from the stated options and write it down. [5×2=10]

(i) XYZ Ltd., is preparing its Sales Budget for the coming 3 months. The Sales Department has given an estimate that Sales will be 2,40,000 units, if the monsoon is good and 1,60,000 units if the monsoon is poor. The probability that the monsoon will be poor is 0.4. The expected Sales Volume for next quarter would be:
A. 1,44,000 units
B. 64,000 units
C. 2,08,000 units
D. None of these.

(ii) The Selling price of the single product manufactured by a company is fixed at ₹ 3,000 per unit. In the coming year, 500 units of the product are likely to be sold. If the total value of investments of the company is ₹ 30 lakhs and it has a target ROI of 15%, the target cost would be :
A. ₹ 1,860
B. ₹ 1,900
C. ₹ 2,100
D. None of these.

(iii) A company using a detailed system of standard costing finds that the cost of investigation of variances is ₹60,000 and if after investigation, it is found that the situation is out of control, the cost of correction is ₹1,00,000. If no investigation is made, the present value of extra cost involved is ₹4,00,000. The probability of process, being out of control, is 20%. The cost of investigation would be :
A. ₹ 80,000
B. ₹ 20,000
C. ₹ 12,000
D. None of these.

(iv) Snow Fall Ltd., operates Throughput Accounting System. The details of Product A per unit are as under:

Selling Price ₹ 75
Material Cost ₹ 30
Conversion Cost ₹ 20
Time to bottleneck resources 10 minutes
The return per hour for Product A is
A. ₹ 270
B. ₹ 150
C. ₹ 120
D. ₹ 90

(v)

Sales Volume	**20,000 units**
Selling Price per unit	**₹5.00**
Marginal Cost per unit	**₹3.00**
Fixed Cost	**₹10,000 per annum**

Compute the Margin of Safety.
A.₹25,000
B.₹10,000
C.₹75,000
D.₹30,000

(c) Define the following terms in not more than two or three sentences: [5×1=5]

(i) Functional Structure
(ii) Bill-of-Materials (BOM)
(iii) Master Production Schedule (MPS)
(iv) Linear Programming
(v) Succession Planning

(d) State whether the following statement are "True" or "False". [5×1=5]

(i) In VAT Analysis, a T-logical structure (many-to-many flow) starts with one or a few raw materials, and the product expands into a number of different products as it flows through its routings.
(ii) Rope is the constraint and therefore sets the pace for the entire system. In simpler terms, the rope is the rate or pace of production set by the system's constraints.
(iii) A Chase Strategy implies matching demand and capacity period by period. This could result in a considerable amount of hiring, firing or laying off of employees; insecure and unhappy employees; increased inventory carrying cost; problems with labour unions and erratic utilization of plant and equipment.
(iv) Bench marking is a process of continuously comparing an organization's business process against the business leader anywhere in the world to gain information that will help the organization to take action to improve performance.
(v) Data Mining is the process of analyzing empirical data. It also enables the extrapolation of information. Such extrapolated results are then used in forecasting and defining trends.

Answer:

(a)

(i) **FAST** or Function Analysis System Technique is an evolution of the **Quality Function Development** process.
(ii) Kaizen is a Japanese term comprising KAI = **change** and ZEN = **better**.
(iii) Real-time communication is a possible function that can be enabled through the

use of **collaborative** tools.

(iv) **Optimism bias** is the demonstrated systematic tendency to be over-optimistic about key project.

(v) Enterprise Risk Management deals with **risks** and **opportunities** affecting value creation.

(b)

(i) **C: 2,08,000 units.**
[1,60,000 x 0.40] + [2,40,000 x 0.60]
= [64,000 + 1,44,000] units = 2,08,000 units.

(ii) **C: ₹2,100.**
Sales Revenue = 500 × ₹ 3,000 = 15,00,000
Less : ROI 15% on ₹ 30 Lakhs = 4,50,000
Target Cost = 10,50,000
Target Cost per unit = Target Cost/500 = 10,50,000 /500 = ₹ 2,100.

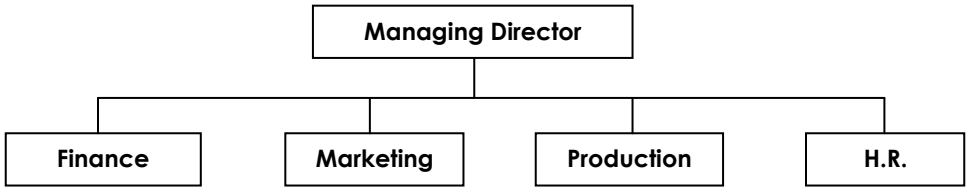
(iii) **A: ₹ 80,000.**
Cost of Investigation = ₹ 60,000 + (0.20 × 1,00,000) = ₹ 80,000.

(iv) **A: ₹ 270.**
(Selling Price – Material Cost) / Time on bottleneck resources.
= [(₹ 75 – ₹ 30)/ 10 minutes] × 60 = ₹ 270.

(v) **C: ₹ 75,000.**
P/V Ratio = [(Selling Price – Marginal cost)/Selling Price]×100%
= [₹(5-3)/₹5]×100= 40%
Margin of Safety = Profit/P/V Ratio
= [(Selling Price per unit – Marginal cost per unit) × number of units- Fixed Cost]/P/V Ratio = [{(₹5 -₹3)×20,000}-₹10,000]/40% = ₹75,000.

(c)

(i) In Functional Structure, each manager is responsible for a specified function as Finance or Marketing.



It is based on the principle of division of labour and achieving excellence in each function.

(ii) **Bill of Materials (BOM)** is a hierarchical listing of the type and number of parts needed to produce one unit of finished product.

(iii) **Master Production Schedule (MPS)** is basically a production schedule for finished goods. It is derived from current orders plus any forecast requirements. MPS is divided into units of time called "brackets". The MPS is also said to be the aggregated plan "disaggregated".

(iv) **Linear Programming** is an optimization technique that allows the user to find a

maximum profit/revenue or a minimum cost, based on the availability of limited resources and certain constraints.

(v) **Succession Planning** is the systematic process of defining future management requirements and identifying candidates who best meet those requirements. It involves using the supply of labour within the organization for future staffing needs.

(d)

(i) **False,** In VAT Analysis, a T-logical structure (on-to-many flow) consists of numerous similar finished products assembled from common assemblies and subassemblies.

(ii) **False,** Drum is the constraint and therefore sets the pace for the entire system. In simpler terms, the drum is the rate or pace of production set by the system's constraints.

(iii) **True,** A Chase Strategy implies matching demand and capacity period by period. This could result in a considerable amount of hiring, firing or laying off of employees; insecure and unhappy employees; increased inventory carrying cost; problems with labour unions and erratic utilisation of plant and equipment.

(iv) **True,** Bench marking is a process of continuously comparing an organisation's business process against the business leader anywhere in the world to gain information that will help the organisation to take action to improve performance.

(v) **True,** Data Mining is the process of analysing empirical data. It also enables the extrapolation of information. Such extrapolated results are then used in forecasting and defining trends.

2.

(a) Explain Quality Planning, Quality Control & Quality Improvement. **[5]**

Answer:

Quality Planning, Quality Control & Quality improvement is the quality trilogy that facilitate quality improvement, which can be explained as under:

Quality Planning	Quality Control	Quality Improvement
• Determine who are the Customers	• Choose control subjects what to control?	• Establish the infrastructure needed to secure annual quality improvement
• Determine the needs of the Customers	• Choose units of measurements – Evaluate Measurements	• Identify the specific needs for improvement – the improvement projects
• Develop product features that respond to the customer's needs.	• Establish standards of performance	• For each project establish a project team with clear responsibility for bringing the project to a successful conclusion
• Develop processes that are able to product feature	• Measure actual performance	• Provide the resources, motivation and training needed by the teams to:
• Transfer the resulting	• Interpret the difference	- Diagnose the causes

plans to the operating forces.	(actual versus standard) • Take action on difference	- Stimulate establishment of a remedy - Establish controls to hold the gains.

(b) Blue Ice Ltd., has adopted a Standard Costing System. The Standard output for a period is 20,000 units. The Standard Cost and Profit per unit is given below:

	₹
Direct Materials (6 units @ ₹1.50)	**9.00**
Direct Labour (6 hrs. @ ₹1.00)	**6.00**
Direct Expenses	**1.00**
Factory Overheads:	
Variable Overheads	**0.50**
Fixed Overheads	**0.60**
Administrative Overheads	**0.60**
	17.70
Profit per unit	**2.30**
Selling Price (Fixed by Government)	**20.00**

Actual production and sales for a period was 14,400 units.

The following are the variance worked out at the end of the period:

	Favourable (₹)	Adverse (₹)
Direct Materials:		
Price Variance	**–**	**8,500**
Usage Variance	**2,100**	**–**
Direct labour:		
Rate Variance	**–**	**8,000**
Efficiency Variance	**6,400**	**–**
Factory Overheads:		
Variable Expenditure Variance	**800**	**–**
Fixed Expenditure Variance	**800**	**–**
Fixed Volume Variance	**–**	**3,360**
Administrative Overheads:		
Expenditure Variance	**–**	**800**
Volume Variance	**–**	**3,360**

You are required to :

(i) Ascertain the details of cost and prepare the Profit and Loss Account in the statement for the period, showing actual profit. [4+3=7]

(ii) Reconcile the actual profit with the standard profit. [3]

Answer:

Blue Ice Ltd.

Ascertainment of Details of Costs :

(14,400 units)	Variance (₹)	Standard Cost (₹)	Actual Cost (₹)
Directs Materials (14,400 × 9)		1,29,600	
Price Variance (Adverse)	8,500		
Usage Variance (Favourable)	(2,100)	6,400	1,36,000
Direct Labour (14,400 x 6)		86,400	
Rate Variance (Adv)	8,000		
Efficiency Variance (Fav)	(6,400)	1,600	88,000
Direct Expenses (14400 × 1)		14,400	14,400
Factory Overheads:			
Variable (14,400 x 0.50)		7,200	
Fixed (14,400 x 0.60)		8,640	
Variable Expenditure Variance (Fav)	(800)		
Fixed Expenditure Variance (Fav)	(800)		
Fixed Volume Variance (Adv)	3,360	1,760	17,600
Administrative Overheads: (14,400 x 0.60)		8,640	
Expenditure Variance (Adv)	800		
Volume Variance (Adv)	3,360	4,160	12,800
Total Cost (14,400 x 17.70)		2,54,880	2,68,800

Profit and Loss Account of Blue Ice Ltd.
for the year ended….

Particulars	₹	₹
Sales Revenue (14400 × 20)		2,88,000
Less: Costs:		
Direct Materials	1,36,000	
Direct Labour	88,000	
Direct Expenses	14,400	
Factory Overhead		
Variable	6,400	
Fixed	11,200	
Administrative Overhead	12,800	2,68,800
Profit (Actual)		19,200
Standard Profit (14,400×2.30)		33,120

Statement of Reconciliation of Actual Profit with Standard Profit

Particulars	₹	₹
Standard Profit		33,120
Add: Favourable Variance:		
Direct Material Usage	2,100	
Direct Labour Efficiency	6,400	
Variable Overhead Expenditure	800	
Fixed Overhead Expenditure	800	
	10,100	
Less: Adverse Variance:		
Direct Material Price	(8,500)	

Direct Labour Rate	(8,000)	
Fixed Overhead Volume	(3,360)	
Administration Overhead Expenditure	(800)	
Administration Overhead Volume	(3,360)	(13,920)
Profit (Actual)		19,200 (Reconciled)

3. (a) What is 'Quality'? What is its relevance to Cot Management? [6]

Answer:

The concept of 'Quality:

The concept of 'Quality' means conformance to requirements. 'Quality' is unobtrusively meeting the needs of the customers. A Product or process that is reliable and that performs its intended function is said to be a quality product. Quality is the extent to which products are free from defects, constraints and items which do not add any value for the customers. Quality is a fulfillment of expectation. Quality is the ability of a product or service to meet a customer's expectation from that product/service. That means doing the right things right. It is related to customer orientation, innovation, teamwork and everyone's responsibility.

Relevance of Quality in Cost Management:

Cost Management is the management of cost related activities (including Quality conformance) achieved by collecting, analysis, evaluating and reporting cost information . Cost Management is the process by which the companies control and plan the costs of doing business. Cost Management is the process of planning and controlling the budgets of a business. It is a form of Management Accounting that allows a business to predict impending expenditures to help reduce the chance of going over budget. Quality has become such an important strategic variable that Cost Management can no longer ignore it. Building up quality means adding up cost. Quality thus is cost and Quality Control and Cost Control are in fact the obverse and reverse of the same coin. The emphasis should be on prevention of errors and failures through Quality Planning. Investment in Quality Control will yield rich returns to the manufacturer through savings in material and man-hours lost, improving productivity and above all profitability through customer satisfaction.

(b) A small-scale manufacturing unit has employed skilled persons for doing pressing and welding operations on various products. The welders produce two products, M^1 and M^2. The press operators also produce two products, N^1 and N^2. Due to specific skill requirements, the press operators can't do welding job and vice-versa. The labour hours and cost data in respect of the above 4 products are as under.

	M^1	M^2	N^1	N^2
Hours per unit	**4**	**4**	**5**	**2**
Price per unit (₹)	**100**	**100**	**160**	**130**
Direct Material per unit (₹)	**36**	**44**	**70**	**90**
Direct Labour Rate per hour	**₹8**	**₹8**	**₹8**	**₹8**
Variable Overheads per unit	**₹4**	**₹4**	**₹6**	**₹6**

The unit incurs ₹1,00,000 per annum on fixed costs for producing the above products. The available labour hours for welding are 20,000 and for pressing 16,000.

The unit has also observed that the market can absorb minimum 2,000 units of M^1 2,500 units of M^2, 1,800 units of N^1 and 2,200 units of N^2. The demand keeps on fluctuating. The manager of the shop has, therefore suggested that the workers should be trained to do either of welding or pressing job so that any excess demand can be fulfilled. It is estimated that this decision will increase the burden of fixed costs by ₹10,000 p.a.

Which option should the company go for? [9]

Answer:

Statement showing computation per hour and determination of priority

	M^1	M^2	N^1	N^2
(i)	₹	₹	₹	₹
(ii) Selling Price	100.00	100.00	160.00	130.00
(iii) Variable Cost				
a. Direct Material	36.00	44.00	70.00	90.00
b. Direct Wages	32.00	32.00	40.00	16.00
c. Variable Overheads	4.00	4.00	6.00	6.00
	72.00	80.00	116.00	112.00
(iv) Contribution	28.00	20.00	44.00	18.00
(v) Contribution per hour	7.00	5.00	8.80	9.00
(vi) Priority	III	IV	II	I

Statement showing calculation of profit before workers are trained

	M^1	M^2	N^1	N^2	Total
	₹	₹	₹	₹	₹
Minimum units	2,000	2,500	1,800	2,200	
Units in remaining time	500			1,300	
(i) Total units	2,500	2,500	1,800	3,500	
(ii) Contribution per unit	28.00	20.00	44.00	18.00	
(iii) Total Contribution	70,000	50,000	79,200	63,000	2,62,200
(iv) Fixed Cost					1,00,000
(v) Profit					1,62,200

Working Notes:

	M^1 hours	N^2 hours
Available	20,000	16,000
Less: used for minimum	18,000	13,400
	2,000	2,600
Units	500 i.e. (2,000/4)	1,300 i.e. (2,600/2)

Statement showing calculation of Profit after Conversion:

	M^1	M^2	N^1	N^2	Total
Minimum units	2,000	2,500	1,800	2,200	
Units in remaining time				2,300	
(i) Total units	2,000	2,500	1,800	4,500	
(ii) Contribution per unit	28.00	20.00	44.00	18.00	
(iii) Total Contribution (₹)	56,000	50,000	79,200	81,000	2,66,200
(iv) Fixed Cost (₹)					1,10,000
(v) Profit (₹)					1,56,200

As company generates more profit before the workers are trained, it is better not provide training to the workers and keep on production as before.

4. (a) Discuss the principal four steps of Target Costing. [5]

Answer:

Principal four steps of Target Costing:

Stage 1: Determine the target price which customers will be prepared to pay for the product.
Stage 2: Deduct a target profit margin from the target price to determine the target cost.
Stage 3: Estimate the actual cost of the product.
Stage 4: If the estimated actual cost exceeds the target cost investigate ways of driving down the actual cost to the target cost.

Target Costing is customer-oriented technique that is widely used by Japanese companies. The target profit margin depends on the planned return on investment for the organization as a whole and profit as a percentage of Sales. This is then decomposed into a target profit for each product which is subsequently deducted from the target price to give the target cost. Then the target cost is compared with predicted actual cost.

(b) A Company manufactures around 200 mopeds. Depending upon the availability of raw materials and other conditions, the daily production has been varying from 196 mopeds to 204 mopeds, whose probability distribution is as given below:

Production/Day	196	197	198	199	200	201	202	203	204
Probability	0.05	0.09	0.12	0.14	0.20	0.15	0.11	0.08	0.06

The finished mopeds are transported in a specially designed three storied lorry that can accommodate only 200 mopeds. Using the following 15 random numbers 82,89,78,24, 53,61,18,45,04,23,50,77,27,54,10 simulate the process to find out:

(i) What will be the average number of mopeds waiting in factory?
(ii) What will be the average number of empty space on the lorry? [10]

Answer:

If the numbers 00 - 99 are allocated in proportion to the probabilities associated with each production level, as shown below, then the daily production levels can be sampled, using random number tables:

Allocation of Random Numbers

Production per day	Probability	Cumulative probability	Random Number Interval
196	0.05	0.05	00-04
197	0.09	0.14	05-13
198	0.12	0.26	14-25
199	0.14	0.40	26-39
200	0.20	0.60	40-59
201	0.15	0.75	60-74
202	0.11	0.86	75-85
203	0.08	0.94	86-93
204	0.06	1.00	94-99

Simulation Work Sheet

		No. of mopeds waiting				
Random numbers	Daily production	Opening balance	current excess production	Current short production	Total waiting	No. of empty space in the lorry
82	202	-	2	-	2	-
89	203	2	3	-	5	-
78	202	5	2	-	7	-
24	198	7	-	2	5	-
53	200	5	-	-	5	-
61	201	5	1	-	6	-
18	198	6	-	2	4	-
45	200	4	-	-	4	-
04	196	4	-	4	-	-
23	198	0	-	2	0	2
50	200	0	-	-	0	-
77	202	0	2	-	2	-
27	199	2	-	1	1	-
54	200	1	-	-	1	-
10	197	1	-	3	-	2
				Total	42	4

Average number of mopeds waiting = 42 ÷ 15 = 2.80
Average number of empty spaces in lorry = 4 ÷ 15 = 0.267

5. (a) State what is Cause – Effect Diagram and when should it be used? [5]

Answer:

The Cause –effect Diagram is one of the powerful tools for quality control. It is called a Fishbone Diagram, because of its shape, or an Ishikawa Chart, after its originator Kaoru Ishikawa, who first used it in 1943.
The Cause – Effect Diagram is used to identify and structure the causes of a given effect.
It is used:

- when investigating a problem, to identify and select key problem causes to investigate or address.
- when the primary symptom (or effect) of a problem causes are not all clear.

- when working in a group, to gain a common understanding of problem causes and their relationship.
- to find causal relationship, such as potential risks or causes of desired effects.

(b) The average number of defectives in 22 sampled lots of 2,000 rubber belts each was found to be 16%. Compute the Value of Upper Control Limit, Lower Control Limit and the Value of Central Line for p-chart. [2+2+1 = 5]

Answer:

Number of lots = 22
Number of rubber belts inspected per lot = 2,000
Average number of defectives per lot = 16%

Hence proportion of defectives per lot, $\bar{p} = 0.16$

Upper Control Limit: UCL = $\bar{p} + 3\sqrt{\bar{p}(1-\bar{p})/n} = 0.16 + 3\sqrt{\frac{0.16 \times 0.84}{2,000}} = 0.16 + 3 \times 0.0082 = 0.1846$

Lower Control Limit: LCL = $\bar{p} - 3\sqrt{\bar{p}(1-\bar{p})/n}$ = 0.16-3 × 0.0082 = 0.1354

Central line $\bar{p}$ = 0.16.

(c) Write a note on Supply Chain Metrics. [5]

Answer:

Supply Chain Metrics are the calculations by which an implementing organization can measure how successful they are in achieving their desired positioning within the competitive market space. It facilitates the following:

(i) Perfect Order Fulfillment
(ii) Order Fulfillment Cycle Time
(iii) Upside Supply Chain Flexibility
(iv) Upside Supply Chain Adaptability
(v) Downside Supply Chain Adaptability
(vi) Supply Chain Management Cost
(vii) Cost of Goods Sold
(viii) Cash-to-Cash Cycle Time
(ix) Return on Supply Chain Fixed Assets
(x) Return on Working Capital.

6. (a) What is Product Life Cycle Costing? State its characteristics and benefits. [1+2+2 = 5]

Answer:

Product Life Cycle Costing (PLCC) is an approach used to provide a long term picture of product line, profitability, feedback on the effectiveness of the life cycle planning and cost data to clarify the economic impact on the alternatives, chosen in the design, engineering phase etc.

Characteristics:

(i) It involves tracing of costs and revenues of each product over several calendar periods throughout their entire life cycle.
(ii) It traces research, design and development costs and total magnitude of these costs for each individual product and compares with product revenue.
(iii) It assists in report generation for costs and revenues.

Benefits:
(i) Results in earlier actions to generate revenue or to lower costs than otherwise might be considered.
(ii) Ensures better decision from a more accurate and realistic assessment of revenues and costs at least within a particular life cycle stage.
(iii) Promotes long-term rewarding.
(iv) Provides an overall framework for considering total incremental costs over the life span of the product.

(b) Operating cost and resale price of equipment A^1 whose purchase price is ₹10,000 are given here:

Year	1	2	3	4	5	6	7
Operating Cost (₹)	1,500	1,900	2,300	2,900	3,600	4,500	5,500
Resale Value (₹)	5,000	2,500	1,250	600	400	400	400

What is the optimum period for replacement? [3]

Answer:

Statement showing computation of average cost per year and determination of optimal period

Year	Net Capital Cost (Cost – Scrap)	Operating Cost	Cumulative Operating Cost	Total Cost	Average Cost
	₹	₹	₹	₹	₹
(1)	(2)	(3)	(4)	(5)	(6)
1	5,000	1,500	1,500	6,500	6,500
2	7,500	1,900	3,400	10,900	5,450
3	8,750	2,300	5,700	14,450	4,816.67
4	9,400	2,900	8,600	18,000	4,500
5	9,600	3,600	12,200	21,800	4,360*
6	9,600	4,500	16,700	26,300	4,383,33
7	9,600	5,500	22,200	31,800	4,542.86

Hence, Replacement period is 5 years when the average cost will be ₹4,360.

(c) A pharmaceutical Company has 100 kg. of A, 180 kg. of B and 120 kg of C available per month. They can use these materials to make three basic pharmaceutical products namely 5-10-5,5-5-10 and 20-5-10, where the numbers in each case represent the percentage by weight of A, B and C respectively in each of products. The cost of these raw materials are given below:

Ingredient	Cost per Kg (₹)
A	80
B	20

C	**50**
Inter Ingredients	**20**

Selling prices of these products are ₹50.5, ₹53.00 and ₹55.00 per kg. respectively. There is a capacity restriction of the company for the product 5-10-5; so as they cannot produce more than 30 kg per month. Determine how much of each of the products they should produce in order to maximize their monthly profit. [7]

Answer:

Let the products to be manufactured be denoted by X_1, X_2 and X_3.

	Ingredients			
Products	**A**	**B**	**C**	**Inter**
X_1	5%	10%	5%	80%
X_2	5%	5%	10%	80%
X_3	20%	5%	10%	65%
Cost per kg	₹80	₹20	₹50	₹20

Cost of X_1 = 5% × ₹80+ 10% × ₹20 + 5% × ₹50 + 80% × ₹20
= ₹[4+2+2.50+16] = ₹24.50/ kg
Cost of X_2 = 5% × ₹80+ 5% × ₹20 + 10% × ₹50 + 80% × ₹20
= ₹[4+1+5+16] = ₹26.00/ kg
Cost of X_3 = 20% × ₹80+ 5% × ₹20 + 10% × ₹50 + 65% × ₹20
= ₹[16+1+5+13] = ₹35.00/ kg

Margin of Product X_1 = ₹50.50 - ₹24.50 = ₹26
Margin of Product X_2 = ₹53.00 - ₹26.00 = ₹27
Margin of Product X_3 = ₹55.00 - ₹35.00 = ₹20

Now, the problem can be formulated in mathematical form as follows:
Maximize $Z = 26x_1 + 27x_2 + 20x_3$

Subject to the constraints

$$\frac{1}{20}x_1 + \frac{1}{20}x_2 + \frac{1}{5}x_3 \le 100$$

or $x_1 + x_2 + 4x_3 \le 2000$ ..... (1)

$$\frac{1}{10}x_1 + \frac{1}{20}x_2 + \frac{1}{20}x_3 \le 180$$

or $2x_1 + x_2 + x_3 \le 3600$ ..... (2)

$$\frac{1}{20}x_1 + \frac{1}{10}x_2 + \frac{1}{10}x_3 \le 120$$

$x_1 + 2x_2 + 2x_3 \le 2400$ ..... (3)

or $x_1 \le 30$ ..... (4)

$x_1, x_2, x_3 \ge 0$ ..... (5)

Where x_1, x_2 and x_3 denote the quantity in kg. of three products to be manufactured.

7. (a) How is the business activities classified for value chain analysis purpose? [5]

Answer:

Porter classified business activities into – A. Primary or Line Activities, and B. Support Activities.

A. Primary Activities: are directly involved in transforming inputs into outputs and delivery and after-sales support to output. They are handled by line functions in an organization. They include -

(i) Material handling and warehousing;
(ii) Transforming inputs into final product;
(iii) Order processing and distribution;
(iv) Communication, pricing and channel management; and
(v) Installation, Repair and parts replacement.

B. Support Activities: are activities that support primary activities. They are handled by the organization's staff functions and include -

(i) Procurement - Purchasing of raw materials, supplies and other consumable Items as well as assets.
(ii) Technology Development - Know-how, procedures and technological inputs needed in every Value Chain activity.
(iii) Human Resource management - Selection, promotion and placement, appraisal, rewards; management development; and labour/employee relations.
(iv) Administration – General management, planning, finance accounting, legal, government affairs and quality management.

(b) ABC Ltd. have two alternative projects (A & B) under consideration, the company can select the project and loose the other, as all the projects have to be done now. The information on the projects is given below:

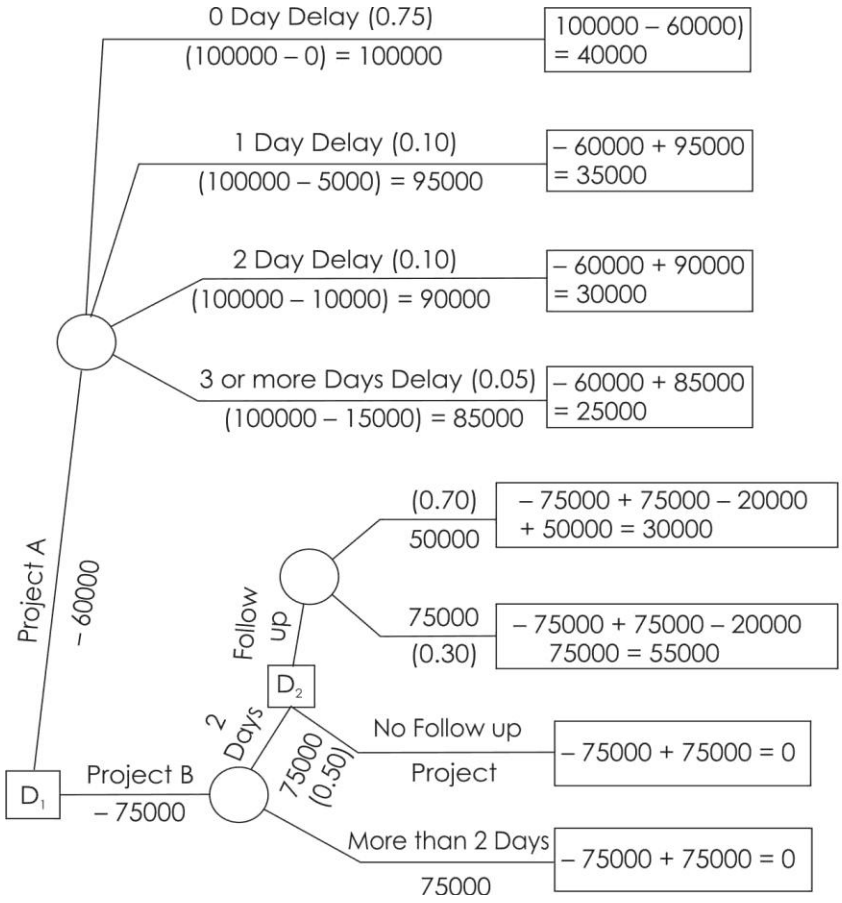
Project A – Capital investment of ₹60,000 is required. If the project is completed in time then revenues of ₹1,00,000 will be received. If not completed on time, a penalty of ₹5,000 per day of delay will be deducted from ₹1,00,000 with a maximum penalty of ₹15,000. The probabilities of delay are:

0 days delay	**0.75**
1 day delay	**0.10**
2 day delay	**0.10**
3 or more day delay	**0.0.5**

Project B - ₹75,000 are required as initial investment. After the first phase is completed, the company will get ₹75,000. If completed in 2 days , ABC Co. , have the option of getting a follow up project that will require expenditure of ₹20,000 and revenues of ₹50,000 with 70% chances and ₹75,000 with 30% chances. If more than 2 days are required for the first, the option for follow up project will not be there. ABC Co. feel that they have equal chances of completing the first phase in 2 days. Construct the decision tree , analyze and give the conclusion. [4+6=10]

Answer:

Decision Tree with Cash Flow and Probabilities



Evaluate of Decision Points

Decision point	Outcome	Probability	Net Profit (₹)	Expected Payoff (₹)
D^2 (i) Follow up project	Higher payoff	0.30	55,000	16,500
	Lower payoff	0.70	30,000	21,000
				37,500
(ii) No follow up project				**0**
D^1 (i) Take **Project A**	0 day delay	0.75	40,000	30,000
	1 day delay	0.10	35,000	3,500
	2 days delay	0.10	30,000	3,000
	3 or more days delay	0.05	25,000	1,250
				37,750
(ii) Take **Project B**	Completed in 2 days	0.50	37,500	18,750
	Completed in more than 2 days	0.50	0	0
				18,750

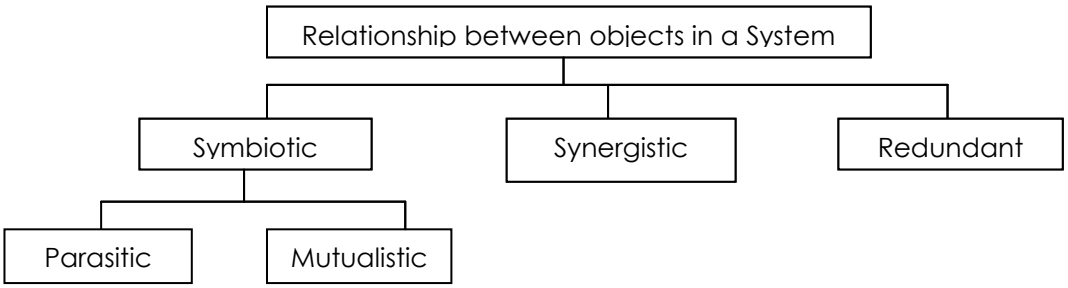
Conclusion: Hence we conclude that Project A must be selected, giving an expected profit of ₹37,750 as against the expected profit of ₹18,750 from Project B.

8. Write short notes on any three: **[5×3=15]**

(a) Relationship between objects in a System
(b) Theory of Constraints
(c) Crowned Prince Syndrome
(d) Management Control System

Answer:

(a) Relationship between objects in a System: Relationships are the bonds that link the objects together. They can be one of the three following categories.



Symbiotic Relationship is one in which the connected systems cannot function alone. The symbiotic relationship between a parasite and a plant is unipolar, to the extent that the parasite cannot live without the plant – parasitic symbiosis. However the Symbiosis Relationship between the production & sales sub-system is bipolar – no production, no sales – no sale, no production – Mutualistic Symbiosis.

Synergistic Relationship adds substantially to the systems performance, synergistic relationships are those in which the cooperative action of semi-independent sub-systems taken together produces a total output greater than the sum of their outputs taken independently. A convenient expression of synergy is to say "2+2 = 5"
Redundant Relationships are those that duplicate other relationships. There are back-up relationships that increase system's reliability but at greater expense.

(b) Theory of Constraints: The Theory of Constraints (TOC) is also known as 'Optimized Production Technology'. TOC is a management philosophy developed by Dr. Goldratt. According to this theory, the strength of any chain, process, or system is dependent upon its weakest link. TOC is systematic and strives to identify constraints to system success and to effect the changes necessary to remove them. TOC focuses its attention on constraints and bottlenecks within the firm that hinder speedy production. The main concept is to maximize the rate of manufacturing output i.e., the throughput of the firm. This requires examination of the bottlenecks and constraints. A bottleneck is an activity, within the firm, where the demand for the resource is more than its capacity to supply. A Constraint is a situational factor, which makes the achievement of objectives more difficult than it would otherwise be, e.g., lack of skilled employees, lack of orders etc., A bottleneck is always a constraint but a constraint need not always be a bottleneck. The main aim of TOC is to increase throughput contribution. This can be done by techniques such as –

- Linear Programming
- Use of shadow pricing
- Variance Analysis using ABC Techniques.
  The main objective of TOC is to maximize Throughput Contribution, subject to supply constraints and demand constraints.

(c) Crowned Prince Syndrome: The first potential problem in Succession Planning is the "Crowned Prince Syndrome" , which occurs when the upper management only considers for advancement, those employees, who have become visible to them. In other words, rather than looking at a wide array of individual employees and their capabilities, upper management focuses only on one person – the would be "Crowned Prince". This person is often one who has been involved in high-projects, has a powerful and prominent mentor or has networked well with the organizational leaders.

There are often employees throughout the organization who are capable of and interested in promotion who may be overlooked because of the more visible and obvious "Crowned Prince", who is likely to be promoted, even if these other employees are available. There is always performance problem and the motivation of current employees may suffer, if they feel that their high performance has been overlooked. This may result in turnover of high quality employees, who have been overlooked for promotion due to the "Crown Prince Syndrome".

(d) Management Control System – Joseph Maciariello & Calvin Kirby have defined Management Control System (MCS) as follows:

MCS is a set of inter-related communication structures that facilitates the processing of information for the purpose of assisting managers in coordinating the parts and attaining the purpose of an organization on a continuous basis.

They view "the entire organization as a control system. 'Control' is seen as a characteristic of a control system; it occurs when the organization is attaining its purpose. Purpose and attainment of purpose are central to the work of control system."

Purposes of MCS, according to them are :

- Coordination of parts of organization.
- Steering those parts to achieve organizational goals.
- Bring along unity out of the diverse activities of an organization.