

**Paper 15 – Strategic Cost Management and Decision Making**

## Paper – 15 – Strategic Cost Management and Decision Making

Full Marks : 100

Time allowed: 3 hours

### Section - A

1. Answer the following and each question carries 2 marks. [10×2=20]

- (i) A company determines its selling price by making up variable costs 60%. In addition, the company uses frequent selling price mark down to stimulate sales. If the mark down average 10%, what is the company's contribution margin ratio?
- (A) 30.6%  
(B) 44%  
(C) 86.4%  
(D) None of these

- (ii) A company produces two joint products, P and V. In a year, further processing costs beyond split-off point spent were ₹ 8,000 and ₹ 12,000 for 800 units of P and 400 units of V respectively. P sells at ₹ 25 and V sells at ₹ 50 per unit. A sum of ₹ 9,000 of joint cost were allocated to product P based on the net realization method. What were the total joint cost in the year?
- (A) ₹ 20,000  
(B) ₹ 10,000  
(C) ₹ 15,000  
(D) None of these

- (iii) A company is to market a new product. It can produce up to 1,50,000 units of this product. The following are the estimated cost data:

	Fixed Cost	Variable Cost
For production up to 75,000 units	₹ 8,00,000	60%
Exceeding 75,000 units	₹ 12,00,000	50%

Sale price is expected to be ₹ 25 per unit.

How many units must the company sell to break even?

- (A) 1,00,000 units  
(B) 1,11,000 units  
(C) 1,27,000 units  
(D) 75,000 units
- (iv) Back flush costing is most likely to be used when
- (A) Management desires sequential tracking of costs  
(B) A Just-in-Time inventory philosophy has been adopted  
(C) The Company carries significant amount of inventory  
(D) Actual production costs are debited to work-in-progress
- (v) If the first time you perform a job takes 60 minutes, how long will the eighth job take if you are on an 80% learning curve?

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- (A) 48 minutes
- (B) 30.72 minutes
- (C) 31 minutes
- (D) None of the above

(vi) Which of the following would decrease unit contribution margin the most?

- (A) 15% decrease in selling price
- (B) 15% increase in variable cost
- (C) 15% decrease in variable cost
- (D) 15% decrease in fixed cost

(vii) A company has the capacity of production of 80,000 units and presently sells 20,000 units at ₹ 100 each. The demand is sensitive to selling price and it has been observed that with every reduction of ₹ 10 in selling price the demand is doubled. What should be the target cost at full capacity if profit margin on sale is taken as 25%?

- (A) ₹ 75
- (B) ₹ 90
- (C) ₹ 60
- (D) ₹ 25

(viii) If the time taken to produce the first unit of a product is 4000 hrs, what will be the total time taken to produce the 5<sup>th</sup> to 8<sup>th</sup> unit of the product, when a 90% learning curve applies?

- (A) 10,500 hours
- (B) 12,968 hours
- (C) 9,560 hours
- (D) 10,368 hours

(ix) ABC Ltd. has developed a new product just complete the manufacture of first four units of the product. The first unit took 2 hours to manufacture and the first four units together took 5.12 hours to produce. The Learning Curve rate is

- (A) 83.50%
- (B) 80.00%
- (C) 75.50%
- (D) None of the above

(x) A company manufactures two products using common material handling facility. The total budgeted material handling cost is ₹ 60,000. The other details are:

	Product X	Product Y
Number of units produced	30	30
Material moves per product line	5	15
Direct labour hour per unit	200	200

Under activity based costing system the material handling cost to be allocated to product X (per unit) would be:

- (A) ₹ 1,000
- (B) ₹ 500
- (C) ₹ 1,500
- (D) ₹ 2,500

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**Answer:**

1. (i) (a) When V (Var. cost) = 100, SP = 160, M. Cost/SP = 60/100  
 SP after 10% mark down of SP = 144, Cost = 60-16 = 44  
 Contribution Margin Ratio = 44/144 = 0.3056 = 30.6%

- (ii) (c)

Products	P	V	Total
Units	800	400	
S.P. (₹)	25	50	
Sales (₹)	20,000	20,000	
Further Costs (₹)	8,000	12,000	
NRV (₹)	12,000	8,000	20,000

Joint cost appropriated ₹ 9,000

Total Joint Cost = (9,000/12,000) x 20,000 = ₹15,000

- (iii) (b) 1,11,000 units.

At a production of 75,000 units or less the fixed costs amount to ₹8 lakh Contribution is ₹10 per unit (₹25 - 60% of ₹ 25). Production will however, be more than this level. Total fixed cost is then ₹ 12 lakh.

Contribution for first 75,000 units = ₹7,50,000

Hence, to meet ₹12 lakh fixed cost, further ₹4,50,000 contribution is required.

Contribution beyond 75,000 units is ₹ 12.5 (₹ 25 - 50% of ₹25).

Additional units to be sold = ₹4,50,000 / ₹12.50 = 36,000 units = 1,11,000 units.

- (iv) (b) back flush costing is most likely to be used when Just-in-time inventory philosophy has been adopted.

- (v) (b) Three doublings from 1 to 2 to 4 to 8 implies .8<sup>3</sup>. Therefore, we have 60 × (.8)<sup>3</sup> = 60 × .512 = 30.72 minutes.

- (vi) (a) A given percentage change in unit sale price must have greater effect on contribution margin than any other factor affected by the same percentage change.

- (vii) (c)

Demand	Price (₹)
20,000	100
40,000	90
80,000	80

Target Cost = ₹ 80 - (25% of 80) = ₹ 80 - 20 = ₹ 60.

- (viii) (d)

Units	Average Time (hours)	Total time (Hours)
1	4000	4000
2	3600	7200
4	3240	12960
8	2916	23328

Total time for 5<sup>th</sup> to 8 units = 23328 - 12960 = 10368 hrs.

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(ix) (b) 80%

Let the learning rate be  $x$ .

Since the first unit took 2 hours, average time for the first two units =  $2x$  and

The average time for the first 4 units =  $2x \times x = 2x^2$ .

$$2x^2 = 5.12 \div 4 = 1.28.$$

$$\text{Or, } x = \sqrt{1.28 \div 2} = \sqrt{0.64}$$

$$= 0.80 \text{ i.e. } 80\%.$$

(x) (b) ₹500 Cost per material more =  $60,000 \div (5 + 15) = ₹3,000$

$$X = \text{Total Cost} = 3,000 \times 5 = 15,000$$

$$\text{Cost per unit} = ₹15,000 \div 30 \text{ units} = 500 \text{ per unit.}$$

### Section – B

Answer any five questions from question nos. 2 to 8. Each question carries 16 marks.

2. (a) K&Co. manufactures and sells 15,000 units of a product. The full cost per unit is ₹ 200. The Company has fixed its price so as to earn a 20% return on an Investment of ₹ 18,00,000.

Required:

(i) Calculate the selling price per unit from the above. Also, calculate the Mark-up % on the Full Cost per unit.

(ii) If the selling price as calculated above represents a mark-up % of 40% on variable cost per unit, calculate the variable cost per unit.

(iii) Calculate the company's income if it had increased the selling price to ₹ 230. At this price, the company would have sold 13,500 units. Should the company have increased the selling price to ₹ 230?

(iv) In response to competitive pressures, the company must reduce the price to ₹ 210 next year, in order to achieve sales of 15,000 units. The company also plans to reduce its investment to ₹ 16,50,000. If a 20% return on investment should be maintained, what is the Target cost per unit for the next year? [8]

(b)(i) Explain the relationship of synergy with strategic realignment in the context of merger.

(ii) What are the problems of strategy evaluation. [4+4]

**Answer:**

2. (a) (i) Computation of selling price and mark-up % on the Full Cost per unit  
 Target Sale price per unit = Full Cost + Target Profit = ₹ 200 + 24 = ₹ 224.  
 So, Mark-up price is = 12%

(ii) Computation of Variable Cost per unit:  
 Above sale price ₹ 224 = VC + 40% thereon, i.e., 140% on VC. So, Variable Cost =  $(224/140\%) = ₹ 160$ .

(iii) Calculate the company's income if selling price are increased

Present Contribution at 15,000 units = $(₹ 224 - ₹ 160) \times 15000 \text{ units}$	₹ 9,60,000
Revised contribution at 13,500 units = $(₹ 230 - ₹ 160) \times 13,500 \text{ units}$	₹ 9,45,000
	₹ 15,000

Hence, increase in sale price is not beneficial, due to reduction in Contribution by ₹ 15,000.

- (iv) Calculate the company's target profit if selling price are reduced and target cost if investment is ₹ 16,50,000

$$\text{Target Profit for next year} = (16,50,000 \times 20\%) / 13,500 = ₹ 24.$$

- (b) (i) Synergy is the term used to describe a situation where different entities cooperate the sum of its parts. The most fundamental of all reasons for mergers is the 'synergy' argument, which serves as the basis of strategic realignment.

Separate companies 'pre-merger values'

Accordingly under synergy, the combined value of a firm is much greater than the value of individual firms. The phenomenon of synergy arises due to economics of scale of operation. Besides, the combined mega features such as enhanced managerial capabilities, creativity, innovativeness, R&D and market coverage capacity expand beyond simple arithmetic. Due to the complementary nature of resources and skills, a widened horizon of opportunities is also responsible for synergy on a merger situation.

- (ii) Task of strategy evaluation suffers from the problems arising out of misinterpretation of environmental forces and corporate resources. The evaluator may not always be correct when he questions the validity of the on-going strategy. This is because of the fact that determination of opportunities and threats is often of a function the perception and the attitude of the person making such exercise as it is of the factor itself. For instance, a dynamic and enterprising planner may perceive abundant opportunities emerging due to economic and technological developments and formulate expansion strategy. This approach may not be appreciated by an evaluator with a conservative attitude and closed cognitive style that holds the view that the enterprise should continue to maintain its present product-market posture owing to disquieting political developments.

Inaccurate assessment of financial, marketing, managerial and other resources of the enterprise and existence of synergistic benefits poses another obstacle to the appraisal of strategy. Thus, for instance, a corporate planner chooses a diversification strategy because in his view the firm has adequate financial and managerial resources to support this plan. But the evaluator questions the utility of such a strategy because he doubts the skill and competence of the senior executives of the firm. Another obstacle that is inherent in strategy appraisal is identification, evaluation and choice of strategic alternatives. In the real world, it has been noted that some organisations without making independent appraisal of opportunities choose a course of action because others in the same line of business have done so. This type of approach renders the product-market strategy weak.

Another source of difficulty involved in appraisal of strategy is misinterpretation of current results. Generally, the central chief executive, without digger deep into the problem, regards the current strategy as unsound if the performance has not been satisfactory and directs the corporate planner to re-examine it. In the same vein, he labels the strategy as sound because of the excellent operating results. But such type of hurried judgment may, at times, be erroneous. Poor results may have been due to improper execution of strategy or outstanding profits were due to certain other

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factors such as war and product rationing. The management swayed by good results may not take serious note of implications of impending environmental changes and accordingly remain indifferent to any modification in the current plan for the future.

3. (a) What is BPR? How can BPR be applied to an organisation?

[2+6]

(b) A manufacturing company currently operating at 80% capacity has received an export order from Middle East, which will utilise 40% of the capacity of the factory. The order has to be either taken in full and executed at 10% below the current domestic prices or rejected totally.

The current sales or cost data are given below:

Items	₹ lakhs
Sales	16.00
Direct Material	5.80
Direct Labour	2.40
Variable Overheads	0.60
Fixed Overheads	5.20

The following alternatives are available to the management:

(i) Continue with domestic sales and reject the export order.

(ii) Accept the export order and allow the domestic market to starve to the extent of excess of demand.

(iii) Increase capacity so as to accept the export order and maintain the domestic demand by –

Purchasing additional plant and increasing 10% capacity and thereby increasing fixed overheads by ₹ 65,000, and Working overtime at one and half time the normal rate to meet balance of the required capacity.

You are required to evaluate each of the above alternatives and suggest the best one.

[6+2]

Answer:

3. (a) BPR is a business process management strategy, originally pioneered in the early 1990s. Focusing on the analysis and design of workflows and process within an organisation. BPR is also known as business process redesign, business transformation, or the business process change management. BPR aimed to help organisations fundamentally rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors. Competition is continuously increasing with respect to price, quality and selection, service and promptness of delivery. Removal of barriers, international cooperation, technological innovations cause competition to intensify. All these changes impose the need for organizational transformation, whether the entire processes, organisation climate and organization structure is changed.

BPR application ways:

(i) Empowering people: i.e., ability to do their work: the right information, the right tools, the right training, the right environment, and the authority they do.

(ii) Providing information in many different ways.

(iii) Providing right tools - with the right tools, the numerical parts of the plans arrive in a consistent, electronic format permitting consolidation by a computer. This leaves the analyst free to do the more productive work of analysing the quality of the plan.

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- (iv) Providing efficient training.
- (v) Eliminating unproductive uses of time.
- (vi) By improving data processing eliminate unnecessary papers.
- (vii) Eliminating unnecessary variations in the procedures and systems.
- (viii) Minimising the burden of record keeping. It means more efficient and effective with the six components of data processing like computing, transmitting, storing, retrieving, manipulating, and displaying data.

(b) Statement showing computation of profit at different alternatives:

Particulars	Alternative I (Present Sales 80%)	Alternative II 40% - Foreign 60% - Domestic	Alternative III 40% - Foreign 80% - Domestic
Sales	16.00	19.20 (7.20 + 12.00)	23.20 (7.20 + 16.00)
Variable Cost:			
Direct material	5.80	7.25	8.70
Direct labour	2.40	3.00	3.60
Variable overheads	0.60	0.75	0.90
Overtime premium	---	---	0.15
Total	8.80	11.00	13.35
Contribution	7.20	8.20	9.85
Fixed Cost	5.20	5.20	5.85 (5.20+0.65)
Profit	2.00	3.00	4.00

From the above computation, it was found that the profit is more at the Alternative III i.e. accepting the foreign order fully and maintaining the present domestic sales, it is the best alternative to be suggested.

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

Particulars	Product X	Product X	Product X
Selling Price (₹)	66	24	15
Material and Other variable cost (₹)	75	30	15
Bottleneck resource time (minutes)	90	40	20

Budgeted factory costs for the period are ₹ 2,21,600. The bottleneck resources time available is 75,120 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.

(b) XYZ Ltd. follows JIT system. It had following transactions in May, 2017:

- (i) Raw materials were purchased for ₹ 2,00,000,
- (ii) Direct labour cost incurred ₹ 36,000,
- (iii) Actual overhead costs ₹ 3,00,000,
- (iv) Conversion costs applied ₹ 3,16,000



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All materials, that were purchased, were placed into production and the production was also completed and sold during the month. The difference between actual and applied costs is computed.

You are required to pass Backflush journal entries.

[8+8]

**Answer:**

4. (a) (i) Calculation of rank according to product return per minute

Particulars	X	Y	Z
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	X	Y	Z
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	II	I	III

Analysis – Product Y yields more contribution compared to average factory contribution per minute, whereas X and Z yield less.

- (b)

In the Books of XYZ Ltd.  
Journal Entries (Backflush)

Particulars	Debit (₹)	Credit (₹)
Raw Material in Process A/c <span style="float: right;">Dr.</span> To Accounts Payable (Being purchase of raw materials)	2,00,000	2,00,000
Conversion Cost Control A/c <span style="float: right;">Dr.</span> To Direct Wages A/c To Accounts Payable A/c (Being overhead cost incurred)	3,36,000	36,000 3,00,000
Finished Goods A/c <span style="float: right;">Dr.</span> To Raw Material in Process A/c To WIP A/c (Being completion of goods)	5,16,000	2,00,000 3,16,000
Cost of Goods Sold A/c <span style="float: right;">Dr.</span> To Finished Goods (Being Cost of finished goods sold transferred)	5,16,000	5,16,000
Cost of Goods Sold A/c <span style="float: right;">Dr.</span> To Overhead Control A/c (Being variance is recognized)	20,000	20,000

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5. (a) What is the purpose of preparation of 'Lean accounting'? [3]

(b) What control process should be considered in 'Target Costing' project? [3]

(c) A manufacturing company has the following production budget for November 2016:

Product A = 20,000 units and Product B = 40,000 units

A standard hour represents 10 units of A and 8 units of B.

Standard wage rate per hour is ₹ 0.50

During the month 7500 hours were paid for @ ₹ 0.60 per hour, which included 350 unproductive hours due to unbudgeted holidays as also loss of production of 250 units of Product-A due to machine breakdown.

Actual production for the month was 24,000 units of A and 38,000 units of B.

Calculate the following:

(i) Direct labour rate variance

(ii) Direct labour idle time variance

(iii) Direct labour efficiency variance.

(iv) Direct labour total variance.

[2½ × 4 = 10]

**Answer:**

5. (a) There are positive and negative reasons for using Lean Accounting. The positive reasons include the issues addressed in the "Vision for Lean Accounting". Lean Accounting provides:

- (i) Provide accurate, timely and understandable information to motivate the lean transformation throughout the organization, to eliminate waste from accounting processes while maintaining thorough financial control,
- (ii) Fully comply with Generally Accepted Accounting Principles (GAAP),
- (iii) Support the lean culture by motivating investment in people. Lean Accounting is nothing more than tracking inflow to outflow as measure of profitability,' which is governed by GAAP.

(b) Following three important control points should take care properly in all target costing projects:

- (i) Identification of principal control point over the course of target costing programme.
- (ii) Point of go/no go decision: If target costing is not reached, management retains power to abandon the design project. There comes a point, when actual performance is very close to expected performance in matter of cost recurrence.
- (iii) Milestone can be in terms of timer (say one month) and/or points (say in design process) at which specific activities are completed.

(c)

Product	Production (Units)	Per standard hours (Units)	Standard hours
A	24000	10	2400
B	38000	8	47500
			7150

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- (i) Direct labour rate variance:  $(SR-AR) \times AT = ₹ (0.50-0.60) \times 7500 = ₹ 750$  (A)
- (ii) Direct labour idle time variance:  $\text{Abnormal idle time} \times SR = 375 \times 0.50 = ₹ 187.50$  (A)
- (iii) Direct labour efficiency variance:  
 $(ST-AT \text{ excluding abnormal Idle Time}) \times SR = (7150 - 7125) \times ₹ 0.50 = ₹ 12.50$  (F)
- (iv) Direct labour total variance:  
 Standard cost-7150 hours @ ₹ 0.50 = ₹ 3,575  
 Actual cost-7500 hours @ ₹ 0.60 = ₹ 4,500  
 Direct labour total variance ₹ 925 (A)

Note:

Abnormal idle time - Unbudgeted holidays	= 350 hours
Machine breakdown-(1/10) x 250	= 25 hours
	375 hours

6. (a) The ABC Pvt. Ltd., which has a satisfactory preventive maintenances system in its plant has installed a new Hot Air Generator based on electricity instead of fuel oil for drying its finished products. The Hot Air Generator required periodic shutdown maintenance. If the shutdown is scheduled yearly, the cost of maintenance will be as under:

Maintenance Cost	Probability
₹ 15,000	0.3
₹ 20,000	0.4
₹ 25,000	0.3

The costs are expected to be almost linear, i.e., if the shutdown is scheduled twice a year the maintenance cost will be double.

There is no previous experience regarding the time taken between breakdowns. Costs associated with breakdown will vary depending upon the periodicity of maintenance. The probability distribution of breakdown cost is estimated as under:

Breakdown Costs per annum	Shutdown once a year	Shutdown twice a year
₹ 75,000	0.2	0.5
₹ 80,000	0.5	0.3
₹ 1,00,000	0.3	0.2

Simulate the total costs – maintenance and breakdown costs – and recommend whether shutdown overhauling should be resorted to once a year or twice a year? [8]

- (b) A captain of a cricket team has to allot five middle batting positions to five batsmen. The average runs scored by each batsman at these positions are as follows:

Batting Position		III	IV	V	VI	VII
Batsmen	A	40	40	35	25	50
	B	42	30	16	25	27
	C	50	48	40	60	50
	D	20	19	20	18	25
	E	58	60	59	55	53

Make the assignment so that the expected total average runs scored by these batsmen are maximum. [8]

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**Answer:**

6. (a) Assigning numbers to maintenance cost once a year basis:

Cost (₹)	Probability	Random Numbers (R.N.)
15,000	0.30	00-29
20,000	0.40	30-69
25,000	0.30	70-99

Assigning random numbers to breakdown costs when overhauling is once a year basis:

Cost (₹)	Probability	Random Numbers (R.N.)
75,000	0.20	00-19
80,000	0.50	20-69
1,00,000	0.30	70-99

The total costs will be as under:

Year	R.N.	Maintenance Cost	R.N.	Breakdown Cost	Total
1	27	15,000	03	75,000	90,000
2	44	20,000	50	80,000	1,00,000
3	22	15,000	73	1,00,000	1,20,000
4	32	20,000	87	1,00,000	1,20,000
5	97	25,000	59	80,000	1,05,000
					1,06,000

Assigning random numbers to maintenance costs, on twice a year basis:

Cost (₹)	Probability	Random Numbers (R.N.)
30,000	0.30	00-29
40,000	0.40	30-69
50,000	0.30	70-99

Assigning random numbers to breakdown costs:

Cost (₹)	Probability	Random Numbers (R.N.)
75,000	0.00	00-49
80,000	0.30	50-69
1,00,000	0.20	80-99

The total costs will be as under:

Year	R.N.	Maintenance Cost	R.N.	Breakdown Cost	Total
1	42	40,000	54	80,000	1,20,000
2	04	30,000	65	80,000	1,10,000
3	82	50,000	49	75,000	1,25,000
4	38	40,000	03	75,000	1,15,000
5	91	50,000	56	80,000	1,30,000
					1,06,000

[Note R.N.s. are taken from table]

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Recommendation: From the above working it may be seen that shutdown maintenance/overhauling once a year will be more economical. The average annual cost will only be ₹ 1.06 lakhs as against 1.20 lakhs when shutdown is twice a year.

(b)

	III	IV	V	VI	VII	20	20	25	35	10
A	40	40	35	25	50	18	30	44	35	33
B	42	30	16	25	27	10	12	20	0	10
C	50	48	40	60	50	40	41	40	42	35
D	20	19	20	18	25	2	0	1	5	7
E	58	60	59	55	53					

Row Operation

$M_3$

10	10	14	25	0
0	12	25	17	15
10	12	19	0	10
5	6	4	7	0
2	0	0	5	7

Column Operation

10	10	15	25	0
0	12	26	17	15
10	12	20	0	10
5	6	5	7	0
2	0	1	5	7

Improved Matrix

10	6	10	25	0
0	8	21	17	15
10	8	15	0	10
5	2	0	7	0
6	0	0	9	11

Maximum Average Runs

A	→	VII	-	50
B	→	III	-	42
C	→	VI	-	60
D	→	V	-	20

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7. (a) SMC has three Departments – Assembly, Painting and Packing with the capability of making three types of Almirah. An Almirah of Type I requires one hour of Assembly, 40 minutes of Painting and 20 minutes of Packing time respectively. Similarly, Type II requires 80 minutes, 20 minutes and one hour respectively. The Type III requires 40 minutes each of Assembly, Painting and Packing time. The total time available at Assembly, Painting and Packing Departments are 600 hours, 400 hours and 800 hours respectively. The unit profits for types I, II and III are Rs40, 80 and 60 respectively. Formulate the problem as a LPP. [10]

- (b) The following table gives data on normal time & cost and crash time & cost for a project.

Activity	Normal		Crash	
	Time (Days)	Cost (₹)	Time (Days)	Cost (₹)
1-2	6	600	4	1,000
1-3	4	600	2	2,000
2-4	5	500	3	1,500
2-5	3	450	1	650
3-4	6	900	4	2,000
4-6	8	800	4	3,000
5-6	4	400	2	1,000
6-7	3	450	2	800

The direct cost per day is ₹ 100.

- (i) Draw the network and identify the critical path;  
 (ii) What are the normal project duration and associated cost? [6]

**Answer:**

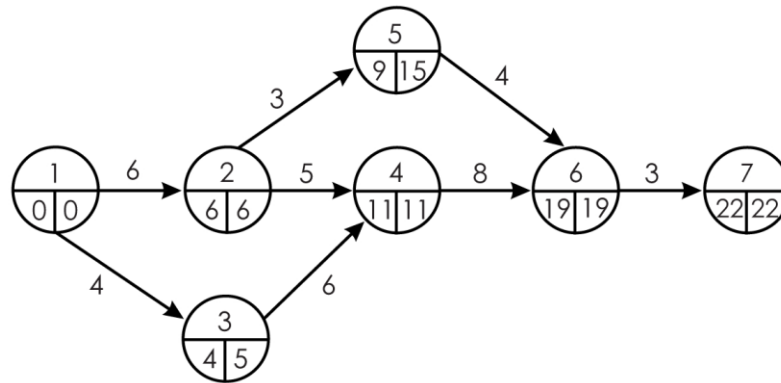
7. (a) Let  $X_1$ ,  $X_2$  and  $X_3$  be the number of units of Type I, Type II and Type III Almirah respectively. The data given in the question can be converted into a matrix form as under –

Particulars	Type I	Type II	Type III	Time Available
Assembly Hours per unit	1	4/3	2/3	600
Painting Hours per unit	2/3	1/3	2/3	400
Packing Hours per unit	1/3	1	2/3	800
Profit per unit	₹40	₹80	₹60	

The LPP is given as under -	
Maximise Revenue Z	= $40 X_1 + 80 X_2 + 60 X_3$
subject to:	
$X_1 + 4/3 X_2 + 2/3 X_3$	$\leq 600$ (Assembly Time Condition)
$2/3 X_1 + 1/3 X_2 + 2/3 X_3$	$\leq 400$ (Painting Time Condition)
$1/3 X_1 + X_2 + 2/3 X_3$	$\leq 800$ (Packing Time Condition)
$X_1, X_2, X_3$	$\geq 0$ (Non-Negativity Assumption)

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- (b) (i) The network for normal activity times indicates a project time of 22 weeks with the critical path 1-2-4-6-7.



- (ii) Normal project duration is 22 weeks and the associated cost is as follows:

Total cost = Direct normal cost + Indirect cost for 22 weeks.

$$= 4,700 + 100 \times 22 = ₹ 6,900.$$

**8. Answer any 4 questions out of 5**

**[4\*4=16]**

- (a) Distinguish between Cost Reduction & Cost Control
- (b) Lean Accounting
- (c) Six Sigma
- (d) Steps to be followed to increase the throughput
- (e) Vogel's Approximation Method (VAM).

**Answer:**

8. (a) Difference between Cost reduction and cost control:

Particulars	Cost Reduction	Cost Control
1. Permanence	Permanent, Real and reflects genuine saving in cost	Represents efforts made towards achievement of pre-determined target or goal,
2. Nature of function	It is a corrective function. It can operate along with an efficient cost control system. This concept Believes that there is always a scope for further reduction in costs.	It is a preventive function, where costs are optimized before these are incurred,
3. Nature of process	It presumes the existence of concerned potential savings in norms or standards and therefore it is a corrective process.	It does not focus on costs independent of revenue nor considers product attributes as given. It is a wholistic control process.
4. Performance evaluation	It is not concerned with maintenance of performance according to standards	The process involves setting up a target, investigating variances and taking remedial measures to correct them
5. Nature of Standards	Continuous process of critical examination includes analysis and challenge of standards. It assumes	It accepts the standards, once they have been fixed. In other words, standards shall remain, as

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	the existence of potential savings in the standards and aims at improving them by bringing out more savings,	it is.
6. Dynamism	Fully a dynamic approach	It is a routine exercise and lacks dynamic approach.
7. Coverage	Universally applicable to all areas of business. Does not depend upon standards, though target amounts may be set.	Limited applicability to those items of cost for which standards can be set.
8. Basic approach	It is not concerned with maintenance of performance according to standards. It challenges the very standards set.	It involves setting up a target, ascertaining the actual performance and doing the variance analysis, followed by remedial actions.

(b) **Lean Accounting:**

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 and management methods are at odds with the lean changes they are making. 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.

Lean Accounting is itself lean, low-waste, and visual, and frees up finance and accounting people's time so they can become actively involved in lean change instead of being merely "bean counters." Companies using Lean Accounting have better information for decision-making, have simple and timely reports that are clearly understood by everyone in the company, they understand the true financial impact of lean changes, they focus the business around the value created for the customers, and Lean Accounting actively drives the lean transformation. This helps the company to grow, to add more value for the customers, and to increase cash flow and value for the stockholders and owners.

(c) **Six Sigma:**

Six Sigma has two key methodologies: DMAIC and DMADV, both inspired by W. Edwards Deming's Plan-Do-Check- Act Cycle: DMAIC is used to improve an existing business process, and DMADV is used to create new product or process designs for predictable, defect-free performance.

**DMAIC**

Basic methodology consists of the following five (5) steps:

- Define the process improvement goals that are consistent with customer demands and enterprise strategy.
- Measure the current process and collect relevant data for future comparison.
- Analyze to verify relationship and causality of factors. Determine what the relationship



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- is, and attempt to ensure that all factors have been considered.
- Improve or optimize the process based upon the analysis using techniques like Design of Experiments.
  - Control to ensure that any variances are corrected before they result in defects. Set up pilot runs to establish process capability, transition to production and thereafter continuously measure the process and institute control mechanisms.

### DMIADV

Basic methodology consists of the following five steps:

- Define the goals of the design activity that are consistent with customer demands and enterprise strategy.
- Measure and identify CTQs (critical to qualities), product capabilities, production process capability, and risk assessments.
- Analyze to develop and design alternatives, create high-level design and evaluate design capability to select the best design.
- Design details, optimize the design, and plan for design verification. This phase may require simulations.
- Verify the design, set up pilot runs, implement production process and handover to process owners.

Some people have used DMAICR (Realize). Others contend that focusing on the financial gains realized through Six Sigma is counter-productive and that said financial gains are simply byproducts of a good process improvement.

- (d) Steps to be followed to increase the throughput The theory of constraints is applied within an organisation by following what are called 'the five focusing steps.' These are a tool that Goldratt developed to help organisations deal with constraints, otherwise known as bottlenecks, within the system as a whole (rather than any discrete unit within the organisation.) The steps are as follows:
- (a) Identify the bottle neck in the system i.e., identification of the limiting factor of the production (or) process such as installing capacity or hours etc.
  - (b) Decide how to exploit the systems bottleneck that means bottleneck resource should be actively and effectively used as much as possible to produce as many goods as possible.
  - (c) subordinate everything else to the decision made in step (b). The production capacity of the bottleneck resource should determined production schedule.
  - (d) Augment the capacity of the bottleneck resource with the minimum capital input.
  - (e) Identify the new bottlenecks in the process and repeat the same above steps to address the bottlenecks.
- (e) Benefits of Inter-firm Comparison
- (a) Inter-firm Comparison makes the management of the organisation aware of strengths and weakness in relation to other organisations in same industry.
  - (b) As only the significant items are reported to the Management time and efforts are not unnecessary wasted.
  - (c) The management is able to keep up to data information of the trends and ratios and it becomes easier for them to take the necessary steps for improvement.
  - (d) It develops cost consciousness among the members of the industry.

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- (e) Information about the organisation is made available freely without the fear of disclosure of confidential data to outside market or public.
- (f) Specialized knowledge and experience of professionally run and successful organisations are made available to smaller units who can take the advantages it may be possible for them to have such an infrastructure.
- (g) The industry as a whole benefits from the process due to increased productivity, standardization of products, elimination of unfair comparison and the trade practices.
- (h) Reliable and collective data enhance the organising power in deal in with various authorities and Government bodies.
- (i) Inter firm comparison assists in a big way in identifying industry sickness and gives a timely warning so that effective remedial steps can be taken to save the organisation.