PAPER – 5: ADVANCED MANAGEMENT ACCOUNTING

*Question No.**1** is compulsory.*

*Answer any **five** questions from the remaining **six** questions.*

Working notes should form part of the answers.

No statistical or other table will be provided with this question paper.

Wherever necessary, candidates may make appropriate assumptions and clearly state them.

Question 1

(a) AB company produces three products X, Y and Z by using Indigenous and Imported raw materials. The relevant information available from the records of the Company is as under:

	Product X	**Product Y**	**Product Z**
Selling price in ₹ per unit	425	380	500
Direct materials in ₹ per unit	180	160	190
Direct Labour ₹ 40 per hour	100	80	120
Variable Overheads @ ₹ 12 per labour hour	30	24	36
Maximum Sales Potential (in units)	1,500	2,500	2,500

The Company also has an agreement to supply 1,000 units of Product X to a vendor which has to be executed. Out of direct materials, 60% is imported raw material and it is purchased at ₹ 24 per kg.

Prepare a statement showing Contribution of these three products assuming availability of imported raw materials is restricted to 24,000 kgs per year. ***(5 Marks)***

(b) The simplex tableau for a maximisation problem of linear programming is given below:

C_j	Product Mix	x_1	x_2	s_1	s_2	Quantity
5	x_2	1	1	1	0	10
0	s_2	1	0	-1	1	3
c_j		4	5	0	0	
z_j		5	5	5	0	50
$c_j - z_j$		-1	0	-5	0	

Answer the following questions giving reasons in brief:

(i) If s_1 is slack in machine A (in hours/week) and s_2 is slack in machine B (in hours/week), which of these machines is being used to the fullest capacity?

(ii) *A customer would like have to one unit of product, x_1 and is willing to pay more than the normal price in order to get it. How much should the price be increased in order to maintain same level of profit?*

(iii) *Machine A (associated with slack s_1 in hours/week) has to be shut down for repairs for 2 hours next week. What will be the effect on profits?*

(iv) *How much would you be prepared to pay for another hour (per week) of machine A and machine B?* ***(4 Marks)***

(c) *RST Co. manufactures products purely carried out by labour. It has 25 direct workers who work for 25 days a month of 8 hours a day. However, the company may resort to overtime if required, at one and half the normal rate of wages. The company has received an order of 8,000 units of a new product at a price of ₹ 160 to be executed within 30 days. The contract stipulates a penalty of ₹10,000 per day for delivery beyond 30 days. It is estimated that at the current level of efficiency each unit requires one hour for the first 2,000 units. Company expects 90% learning curve for this type of work. The cost data is as under:*

Direct materials	*₹ 75 per unit*
Direct labour (1hour/unit)	*₹ 30 per unit*
Variable overhead	*₹ 12 per direct labour hour*
Fixed overhead	*₹ 1,20,000 per month (Fixed overheads are to be incurred evenly throughout the month)*

Calculate:

(i) *Overtime hours if the option of overtime is exercised to avoid the penalty.*

(ii) *The cost and profit under both the options i.e. to pay the penalty by working in normal hours or to work overtime to avoid penalty.* ***(5 Marks)***

(d) *MK international Ltd. has developed a new product 'RIO' which is to be launched soon. The company anticipates to sell 1,25,000 of these units at a sale price of ₹ 400 per unit over the product life cycle of three years. The other data pertaining to Product 'RIO' are as under:*

Research and development cost	*₹ 32,50,000*
Manufacturing cost per unit	*₹ 175*
Fixed manufacturing cost per year	*₹ 12,75,000*
Marketing cost per unit (including 4% commission on sales)	*₹ 90*
Fixed marketing cost per year	*₹ 6,72,000*
Administration cost	*₹ 6,60,000 per year*
Warranty expenses	*4 replacement parts per 50 units at ₹ 30 per part.*

Calculate:

(i) The life cycle cost of the product 'RIO'.

(ii) The revised life cycle cost if the MK international Ltd. increases sales by 12% through 5% reduction in sale price along with increase in fixed manufacturing cost by ₹1,20,000 per year.

(iii) Should the company go for reduction in sale price? ***(6 Marks)***

Answer

(a) **Statement Showing "Ranking for Manufacturing"**

	X (₹)	Y (₹)	Z (₹)
Maximum Sales (in units)	1,500	2,500	2,500
	₹	₹	₹
Selling Price *per unit*	425	380	500
Less: Direct Material *per unit* (local @ 40%)	72	64	76
Less: Direct Material *per unit* (imported @ 60%)	108 (4.5kg × ₹24)	96 (4.0kg × ₹24)	114 (4.75kg × ₹24)
Less: Direct Labour *per unit*	100	80	120
Less: Variable Overheads *per unit*	30	24	36
Contribution *per unit*	115	116	154
Imported Material Required *per unit*	4.5 kg	4.0 kg	4.75 kg
Contribution *per kg of imported material*	25.55…	29.00	32.42
Ranking	III	II	I

Statement Showing "Optimum Production Plan"

Product	Units	Raw Material / unit (kg.)	Material Required (kg.)	Balance Material (kg.)
X	1,000	4.5	4,500	19,500
Z	2,500	4.75	11,875	7,625
Y (Balance)	1,906*	4.0	7,625	---

* $\left(\frac{7,625\,kg.}{4kg.}\right)$; Ignored fraction

Contribution Statement

Product	No of Units	Contribution/unit (₹)	Total Cont. (₹)
X	1,000	115	1,15,000
Z	2,500	154	3,85,000
Y	1,906	116	2,21,096
		Total Contribution	7,21,096

(b) **(i)** Machine A is being used to the full capacity because, corresponding slack variable s_1 has a zero value in the solution.

(ii) $C_j - Z_j$ for x_1 being -1, production of each unit of x_1 would cause a reduction of 1 rupee. Thus, the price for x_1 should be increased by at least 1 rupee to ensure no reduction of profits.

(iii) When 2 hours are lost (due to repairs), then production of x_2 would decrease by 2 units and the total profit decrease by ₹ 10.

(iv) The shadow price of hours on machine A and machine B are being ₹ 5 and ₹ 0 respectively, these are the maximum prices one would be prepared to pay for another hour of capacity for these two machines.

(c) (i) Hours Required for 8,000 units

Units	Hours
2,000	2,000
4,000	3,600 hours (4,000 units × 1 hr × 0.90)
8,000	6,480 hours (8,000 units × 1 hr × 0.90 × 0.90)

Hours Available in a month : 5,000 (25 Days × 8 Hrs. × 25 Workers)

Overtime Hours : 6,480 hrs. – 5,000 hrs. = 1,480 hrs.

(ii) Statement Showing "Cost and Profit"

Particulars	Overtime Option Amount (₹)	Normal Time Option Amount (₹)
Direct Material (₹75 × 8,000 units)	6,00,000	6,00,000
Direct Labour (**₹30** × 6,480 hrs.)	---	1,94,400
Direct Labour (**₹30** × 5,000 hrs. + **₹45** × 1,480 hrs.)	2,16,600	---

Variable Overhead (₹12 × 6,480 hrs.)	77,760	77,760
Fixed Overhead $\{₹1,20,000 /30 Days × (30 + **9***) Days)	1,20,000	1,56,000$
Penalty (@ ₹10,000 for **9*** Days) * (~**30 Days** / 5,000 hrs. × 1,480 hrs.)	---	90,000
Total Cost	10,14,360	11,18,160
Sales	12,80,000	12,80,000
Profit	2,65,640	1,61,840

☞ *The question does not state **number of days for a month** to be taken. This solution is based on **30 days** a month. Question can also be solved by taking 25 days.*

(d) (i) Statement Showing "RIO's Life Cycle Cost (1,25,000 units)"

Particulars	Amount (₹)
Research and Development Cost	32,50,000
Manufacturing Costs (₹175 × 1,25,000 units + ₹12,75,000 × 3)	2,57,00,000
Marketing Costs [(₹74 + ₹16) × 1,25,000 units + ₹6,72,000 × 3)	1,32,66,000
Administration Cost (₹6,60,000 × 3)	19,80,000
Warranty (1,25,000 units / 50 units × 4 parts × ₹30)	3,00,000
Total Cost	4,44,96,000

(ii) Statement Showing "RIO's Revised Life Cycle Cost (1,40,000 units)"

Particulars	Amount (₹)
Research and Development Cost	32,50,000
Manufacturing Costs (₹175 × 1,40,000 units + ₹13,95,000 × 3)	2,86,85,000
Marketing Costs [(₹74 + ₹380 × 4%) × 1,40,000 units + ₹6,72,000 × 3)]	1,45,04,000
Administration Cost (₹6,60,000 × 3)	19,80,000
Warranty (1,40,000 units / 50 units × 4 parts × ₹30)	3,36,000
Total Cost	4,87,55,000

(iii) Workings

Statement Showing "RIO's Life Time Profit"

Particulars	Amount (₹) 1,25,000 units	Amount (₹) 1,40,000 units
Sales	5,00,00,000 (1,25,000 × ₹ 400)	5,32,00,000 (1,40,000 × ₹ 380)
Less: Total Cost	4,44,96,000	4,87,55,000
Profit	55,04,000	44,45,000

Decision

Reducing the price by 5% will decrease profit by 19.24% (₹ 10,59,000). Therefore, 'RIO' should not cut the price.

Question 2

(a) XYZ chemical company has three plants located in a state. The daily chemical production at each plant is as follows:

Plant-I: 12 million litres

Plant-II: 2 million litres

Plant-III: 20 million litres

Each day, company must fulfil the needs of its four distribution centres.

Minimum requirements at each centre are as follows:

Distribution centre 1: 14 million litres

Distribution centre 2: 10 million litres

Distribution centre 3: 6 million litres

Distribution centre 4: 4 million litres

Cost in hundreds of rupees of shipping one million litres from each plant to each distribution centre is given in the following table:

		Distribution Centre			
		D1	***D2***	***D3***	***D4***
Plant	***P1***	*2*	*3*	*11*	*7*
	P2	*1*	*0*	*6*	*1*
	P3	*5*	*8*	*15*	*9*

Required:

(i) Find initial basic feasible solution for given transportation problem by using Vogel's approximation method if the object is to minimize the total cost.

(ii) Is this the degenerate solution? ***(6 Marks)***

(b) A small project consisting of eight activities has the following characteristics:

Activity	Time (Weeks)		
	Optimistic	Pessimistic	Most likely
1–2	4	12	8
1–3	3	5	4
1–4	4	8	6
2–5	4	6	5
3–5	3	3	3
4–6	7	11	9
5–6	6	12	9
5–7	5	9	7
6–7	3	5	4

Required:

(i) Draw the project network and find out the critical path and expected completion time.

(ii) Calculate the standard deviation and variance of the project.

(iii) What is the probability of the project completion at least 2 weeks earlier than the expected time?

(iv) If the project due date for completion is 27 weeks, what is the probability of not meeting the due date?

(v) If the project manager wants to be 90% sure of the completion, how many weeks before the due date should he commence the project?

Value of $Z_{1.155} = 0.3759$, $Z_{0.58} = 0.2190$, $NT(Z)_{0.40} = 1.28$ ***(10 Marks)***

Answer

(a) (i) The given problem is a balanced minimization transportation problem. The objective of the XYZ chemical company is to minimize the cost. Let us find the initial feasible solution using Vogel's Approximation method (VAM).

	D1	D2	D3	D4	Prod.	Diff.
P1	2 [2]	3 [10]	11	7	12/2/0	1 1 5
P2	1	0	6	1 [2]	2/0	1 - -
P3	5 [12]	8	15 [6]	9 [2]	20/8/6/0	3 3 4
Req.	14/12/0	10/0	6/0	4/2/0	34	
Difference	1	3	5	6		
	3	5	4	2		
	3	-	4	2		

(ii) When the number of occupied cells in an initial basic solution are less than m+n-1 (where 'm' and 'n' are the number of rows and columns respectively), the solution is called a degenerate solution.

Here, It can be seen that it is **not a degenerate solution** since the number of allocations are 6 (= 4+3-1).

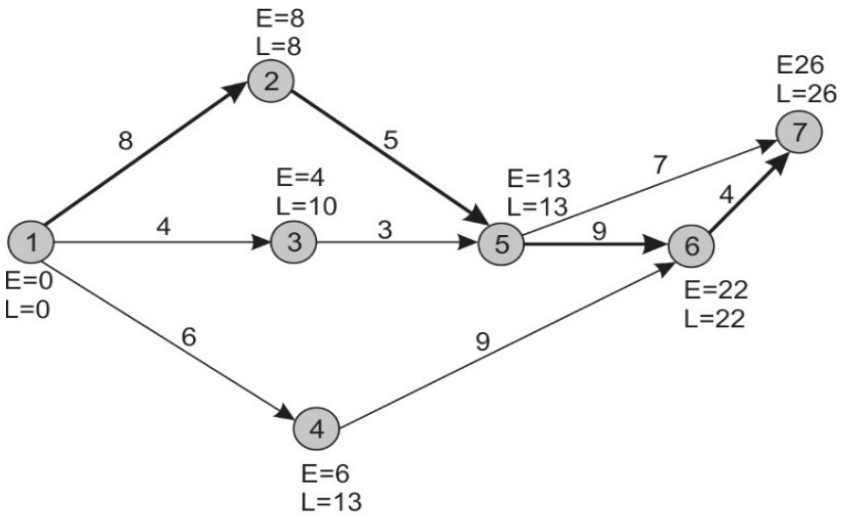
(b) Workings

The Expected Time and Variance for each of the activities (in Weeks):

Activity	Time Estimates (Weeks)			Expected Time	Variance
	Optimistic (t_o)	Most Likely (t_m)	Pessimistic (t_p)	$t_e = \frac{t_o + 4t_m + t_p}{6}$	$S_t^2 = \left(\frac{t_p - t_o}{6}\right)^2$
1–2	4	8	12	8	$\frac{16}{9}$
1–3	3	4	5	4	$\frac{1}{9}$
1–4	4	6	8	6	$\frac{4}{9}$
2–5	4	5	6	5	$\frac{1}{9}$

3–5	3	3	3	3	0
4–6	7	9	11	9	$\frac{4}{9}$
5–6	6	9	12	9	1
5–7	5	7	9	7	$\frac{4}{9}$
6–7	3	4	5	4	$\frac{1}{9}$

(i) The Network:



Expected Completion Time (T_e) = **26 Weeks**

(ii) Variance of the Project 1–2–5–6–7 (σ_e^2) = $\frac{16}{9}+\frac{1}{9}+1+\frac{1}{9}$

= **3**

Standard Deviation of the Project (σ_e) = $\sqrt{3}$

= **1.732**

(iii) Probability that Project Completion *at least 2 weeks earlier*:

Prob. $\left\{ z = \frac{T_s - T_e}{\sigma} = \frac{24 - 26}{1.732} = -1.155 \right\}$

Prob. {z = -1.155} = 0.50 - 0.3759

= 0.1241*or* 12.41%

Thus, the Probability of Completing the Project *in less than 24 weeks* is **12.41%**

(iv) Probability of Completing of Project by 27 Weeks is given by Z = $\frac{27 - 26}{1.732}$

Or = 0.58

Probability {Z = 0.58} = 0.2190 + 0.50

= 0.7190

Probability of *not meeting* Due Date (27 Weeks) = 1 - 0.7190

= 0.281

Or = **28.10%**

(v) Expected Time if the Project to be completed (with 90% Chance):

At 90% Chance Z equals to 1.28

Accordingly, $1.28 = \frac{T_s - 26}{1.732}$

Or $T_s = 28.22$

Hence, Expected Time of Completing the Project with 90% of Chances is **28.22 Weeks**.

Accordingly, **28.22 Weeks Before the Due Date** project manager should commence the project.

Question 3

(a) A Company produces three products P, Q and R for which the standard cost per unit and quantities produced are as under:

Products	***P***	***Q***	***R***
Units produced and sold	*36,000*	*48,000*	*96,000*
Direct material cost per unit (`)	*60*	*48*	*45*
Direct labour cost per unit (`)	*30*	*24*	*18*
Machine hours per unit (hours)	*0.50*	*0.40*	*0.30*

Total production overheads are absorbed on machine hour basis. The rate is ₹ 60 per machine hour.

The Company has analysed its operations and determined that five activities act as cost drivers for overheads. Data relating to five activities are given below:

Activity Area	Cost Driver	Cost of each activity as %of total production overhead cost
Store receiving	Number of requisitions	25%
Machine set up	Number of set ups	20%
Machine running	Machine hours worked	25%
Packing	Packing time in hours	16%
Storage	Area in square metres	14%

The investigation into the production overhead activities for the period revealed the following:

Activity	P	Q	R
Number of requisitions	1,200	1,500	3,900
Number of machine set ups	60	120	320
Packing hours	3,000	4,800	10,200
Storage (Sq metres)	10,800	12,000	19,200

Required:

(i) Calculate total production overheads.

(ii) Prepare product cost statement showing per unit cost under traditional absorption costing method.

(iii) Calculate the cost driver rates.

(iv) Prepare product cost statement showing per unit cost under activity based costing method.

(v) What is the difference in costs due to adoption of traditional absorption costing method and activity based costing method? ***(10 Marks)***

(b) MN Ltd. is a confectionery company and it sells confectionery items. Past data of demand per day with frequency is given below:

Demand (in kgs)	0	5	10	15	20	25
No. of days	4	22	16	42	10	6

The company has scope to meet 12 kg demand per day. The life of the product is one day. It will be produced according to demand. It cannot hold as inventory. The contribution is ₹10 per kg.

Using the following random numbers, simulate 10 days demand for the confectionery items.

35, 52, 90, 13, 23, 73, 34, 57, 35, 83

Required:

(i) Allocate random numbers and simulate for 10 days.

(ii) Calculate average demand of confectionery items per day fulfilled.

(iii) Calculate amount of loss (Due to not fulfilling the demand). ***(6 Marks)***

Answer

(a) (i) Statement Showing "The Total Production Overheads"

	Hrs.	Production Overheads (₹)
Product P	18,000 (36,000 hrs × 0.50)	10,80,000 (18,000 hours x ₹60)
Product Q	19,200 (48,000 hrs × 0.40)	11,52,000 (19,200 hours x ₹60)
Product R	28,800 (96,000 hrs × 0.30)	17,28,000 (28,800 hours x ₹60)
Total Production Overheads (₹)		39,60,000

(ii) Product Cost Statement

(Based on the Traditional Absorption Costing Method)

	Product P	Product Q	Product R
Units	36,000	48,000	96,000
Direct Materials Cost (₹)	60	48	45
Direct Labour Cost (₹)	30	24	18
Overheads (₹)	30 (0.50 hrs × ₹60)	24 (0.40 hrs × ₹60)	18 (0.30 hrs × ₹60)
Total Cost of Products (₹)	120	96	81

(iii) Calculation of "Cost Driver Rate"

Activity Area	Cost [A] (₹)	Cost Driver [B]	Cost Driver Rate [A]÷[B] (₹)
Store Receiving (25%)	9,90,000	Number of Req. (6,600)	150.00
Machine Setup (20%)	7,92,000	Number of Setups (500)	1,584.00
Machine Running (25%)	9,90,000	Machine Hrs. (66,000)	15.00
Packing (16%)	6,33,600	Packing Time Hours (18,000)	35.20
Storage (14%)	5,54,400	Area in Sq. Mtr. (42,000)	13.20
Total	39,60,000		

(iv) Statement Showing Computation of Cost of Products
(Using 'Activity Based Costing Method')

	Product P	Product Q	Product R
Units	36,000	48,000	96,000
Direct Materials Cost (₹)	60	48	45
Direct Labour Cost (₹)	30	24	18
Overheads (Refer to W.N.)	22.03	21.47	22.25
Cost *per unit* (₹)	112.03	93.47	85.25

Working Note

Statement Showing "Overheads Allocation"

Particulars of Cost	Cost Driver	P	Q	R	Total
Store Receiving	Number of Req.	1,80,000 (1,200 × ₹150)	2,25,000 (1,500 × ₹150)	5,85,000 (3,900 × ₹150)	9,90,000
Machine Setup	Number of Setups	95,040 (60 × ₹1,584)	1,90,080 (120 × ₹1,584)	5,06,880 (320 × ₹1,584)	7,92,000
Machine Running	Machine Hrs.	2,70,000 (18,000 × ₹15)	2,88,000 (19,200 × ₹15)	4,32,000 (28,800 × ₹15)	9,90,000

Packing	Packing Time Hrs.	1,05,600 (3,000 × ₹35.20)	1,68,960 (4,800 × ₹35.20)	3,59,040 (10,200 × ₹35.20)	6,33,600
Storage	Area in Sq. Mtr.	1,42,560 (10,800 × ₹13.20)	1,58,400 (12,000 × ₹13.20	2,53,440 (19,200 × ₹13.20)	5,54,400
Overhead (₹)		7,93,200	10,30,440	21,36,360	39,60,000
Units		36,000	48,000	96,000	
Overhead (₹)/ unit		22.03	21.47	22.25	

(v) Difference in Costs

Particulars		P (₹)	Q (₹)	R (₹)
Cost as per Traditional Costing	...(a)	120.00	96.00	81.00
Cost as per Activity Based Costing	...(b)	112.03	93.47	85.25
	...(a) – (b)	7.97	2.53	(-) 4.25

(b) (i) The demand pattern yield the following probability distribution. The numbers 00-99 are allocated in proportion to the probabilities associated with each event.

Demand (kg)	Prob.	Cum Prob.	Random Numbers Allocated
0	0.04	0.04	00 – 03
5	0.22	0.26	04 – 25
10	0.16	0.42	26 – 41
15	0.42	0.84	42 – 83
20	0.10	0.94	84 – 93
25	0.06	1.00	94 – 99

Let us simulate the demand for the next ten days using the given random numbers.

Day	R. No.	Demand (kg)	Production (kg)	Unsatisfied Demand (kg)
1	35	10	10	-
2	52	15	12	3
3	90	20	12	8
4	13	5	5	-

5	23	5	5	-
6	73	15	12	3
7	34	10	10	-
8	57	15	12	3
9	35	10	10	-
10	83	15	12	3
	Total	120	100	20

(ii) Average Demand of Confectionery Items per day fulfilled = 100/10 = 10 kg

(iii) Loss Due to Not Fulfilling the Demand = 20 kg × ₹10 = ₹200

Question 4

(a) UV Limited manufactures a product ZED. It currently operates at 70% capacity. It has received an export order which will utilize 50% of the capacity of the factory. The order has to be either taken in full or rejected totally. The order has to be executed at a price of ₹ 86 per unit and company has to incur additional cost of packing and forwarding of ₹ 2.50 per unit on the goods exported. Commission @ 3% will be payable to overseas agent.

Other information available is as under:

Sale value 63,000 units @ ₹ 95 per unit	*₹ 59,85,000*
Direct materials @ ₹ 42.10 per unit	*₹ 26,52,300*
Variable manufacturing overheads	*₹ 4,41,000*
Variable selling & distribution overheads (including 2% commission on domestic sales)	*₹ 4,34,700*
Fixed overheads	*₹ 6,75,000*
P/V ratio	*20%*

Following three alternatives are available to the management:

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

(ii) Accept the export order by reducing the domestic sale.

(iii) Increase the capacity by 10% by installing a new machine costing ₹ 2,50,000. Fixed overheads will increase by ₹ 96,000. Opportunity cost of investment is 15%.

Overtime is to be paid at one and a half time the normal rate to meet the balance of the required capacity.

Required:

(i) Prepare Statement of profitability for each of the above three alternatives.

(ii) Which is the best alternative in terms of profitability? ***(8 Marks)***

(b) MH hotel has a capacity of 50 rooms, each of which can accommodate one or two guests. Guests staying in hotel are provided with free facilities like sports centre, kids zone, swimming pool etc. The details in the budget for the year ending 31-3-2018 are narrated below:

(i) Standard room rent of ₹ 3,500 per night during high season i.e. May, June, July, December and January and for the remaining months (low season) standard room rent of 1,800 per night will be charged.

(ii) Average room occupancy per night during high season is 80% and during low season is 50%.

(iii) The hotel is registered with number of internet based hotel providers. It is expected that subject to capacity available, an average of 15 rooms per night can be sold through them. These bookings will be in addition to the occupancy level stated in point (ii). The internet service provider will pay 60% of the standard booking rate.

(iv) Variable cost per room night will be ₹ 1,075 per room night.

(v) Fixed cost will be ₹ 12,00,000 per month. However, when occupancy is 100%, fixed cost will increase by ₹ 9,000 per night.

Prepare budgeted profitability statement for the year ending 31-03-2018 showing the details of revenue, costs and profits. ***(8 Marks)***

Answer

(a) (i) Statement Showing "Contribution" *per unit*

Items of Cost	Domestic (₹)	Export (₹)
Sales Price	95.00	86.00
Direct Material	42.10	42.10
Direct Labour (*Balancing Figure)	20.00*	20.00
Variable Manufacturing Overheads $\left(\frac{`\ 4,41,000}{63,000 units}\right)$	7.00	7.00
Variable Selling & Distribution Overheads *excluding* Commission $\left(\frac{`\ 4,34,700 - `\ 59,85,000 \times 2\%}{63,000 units}\right)$	5.00	5.00
Commission on Sales $(`\ 95 \times 2\%)$; $(`\ 86 \times 3\%)$	1.90	2.58
Packaging and Forwarding	---	2.50
Contribution $(`\ 95 \times 20\%)$	₹ 19	₹ 6.82

Statement Showing 'Profitability'

	Alternative One	Alternative Two	Alternative Three*
Capacity Utilization	**70%**	**100%**	**110%**
Domestic Sales	63,000	45,000	54,000
Export Sales	---	45,000	45,000
	₹	₹	₹
Contribution (Ex. Overtime)	₹ 11,97,000 (63,000 ×₹19)	₹ 11,61,900 (45,000×₹19+ 45,000×₹6.82)	₹ 13,32,900 (54,000×₹19+ 45,000×₹6.82)
Less: Overtime Payment	---	---	90,000 (₹ 20×50% ×9,000 units)
Less: Fixed Overheads	6,75,000	6,75,000	7,71,000
Less: Opportunity Cost	---	---	37,500 (2,50,000×15%)
Profit	₹ 5,22,000	₹ 4,86,900	₹ 4,34,400

(ii) ***Alternative (i)*** is best alternative in terms of profitability.

☞ ***Alternative (iii)-** *This question can also be solved by considering **120% capacity utilization (i.e. required)** as question states export order will require 50% capacity over 70% capacity for domestic sales. In such case, decision will change and alternative on 120% capacity basis would be the best alternative in terms of profitability.*

(b) Working Note

Particulars	High Season	Low Season
Nights	154N (31+30+31+31+31)	211N (28+31+30+31+30+31+30)
No. of Rooms	50	50
Occupancy	80%	50%
Room Nights (normal sale)	6,160 [154N×50×80%]	5,275 [211N×50×50%]
Un- Occupied Rooms per night	10 [50×20%]	25 [50×50%]

No. of Rooms (can be sold through Internet)	15	15
No. of Rooms (sold through Internet)	10	15
Room Nights (internet sale)	1,540 [154N×10]	3,165 [211N×15]
Standard Room Rent	₹ 3,500	₹ 1,800
Less: Variable Cost *per room night*	₹ 1,075	₹ 1,075
Contribution (normal sale)	₹ 2,425	₹ 725
Room Rent- Internet Sale	₹ 2,100 [3,500×60%]	₹ 1,080 [1,800×60%]
Less: Variable Cost *per room night*	₹ 1,075	₹ 1,075
Contribution (internet sale)	₹ 1,025	₹ 5

Budgeted Profitability Statement

for the year ending 31st March 2018

Particulars	High Season (₹)	Low Season (₹)	Total (₹)
Revenue			
Normal Sale	2,15,60,000 [6,160 × ₹ 3,500]	94,95,000 [5,275 × ₹ 1,800]	3,10,55,000
Internet Sale	32,34,000 [1,540 × ₹ 2,100]	34,18,200 [3,165 × ₹ 1,080]	66,52,200
Total Revenue …(A)	2,47,94,000	1,29,13,200	3,77,07,200
Costs			
Variable Cost	82,77,500 [(6,160 + 1,540) × ₹ 1,075]	90,73,000 [(5,275 + 3,165) × ₹ 1,075	1,73,50,500
Fixed Cost	60,00,000 (5 × ₹ 12,00,000)	84,00,000 (7 × ₹ 12,00,000)	1,44,00,000
Additional Fixed Cost	13,86,000 (154N× ₹ 9,000)	---	13,86,000
Total Costs …(B)	1,56,63,500	1,74,73,000	3,31,36,500
Profit …(A) - (B)	91,30,500	(-)45,59,800	45,70,700

Question 5

(a) *S. Ltd. produces and sells a single product. The product is manufactured by mixing two raw materials Q and R. The standard cost data of the product is as follows:*

Raw material input:	*Q 3 kg @ ₹ 18.00 per kg*	*₹ 54.00*
	R 7kg. @ ₹ 6.00 per kg	*₹ 42.00*
Raw material cost per kg of input		*₹ 96.00*
Yield		*96%*
Raw material cost per kg of output		*₹ 100*
Fixed production overheads per kg of output		*₹ 8.00*
Total standard cost per kg of output		*₹ 108.00*

The budgeted and actual data are as follows:

Budgeted data		***Actual data***	
Sales	*72,000 kg*	*Sales*	*71,000 kg*
Production	*70,000 kg*	*Production*	*69,000 kg*
Opening inventory	*2,000 kg (valued at standard cost)*	*Cost per kg of Q*	*₹ 18.10*
		Cost per kg of R	*₹ 5.80*
Selling price per kg	*₹ 200*	*Selling price per kg*	*₹ 203.00*
Fixed production overheads	*₹ 5,60,000*	*Fixed production overheads incurred*	*₹ 5,08,000*
		Input of Q	*2,21,000 kg*
		Input of R	*4,79,000 kg*

The fixed production overhead absorption rate is based on the budgeted production.

Calculate Sales price variance, Sales volume variance, Material price variance. Material mix variance, Material yield variance, Fixed overhead expenditure variance and Fixed overhead volume variance. ***(8 Marks)***

(b) *A company manufactures two products X and Y. The current pattern of sales of Product X and Product Y is in the ratio of 5:3. The budgeted data for the quarter ending 30-09-2017 is as under:*

Particulars	***Product X***	***Product Y***
Direct material cost per unit	*₹ 161*	*₹ 176*

Direct labour cost per unit	*₹ 75*	*₹ 90*
Variable overheads per unit	*₹ 30*	*₹ 50*
Commission on sales	*4% of selling price*	*5% of selling price*
PIV ratio	*20%*	*16%*
Stock as on 1-7-2017	*1,400 units*	*1,050 units*

The annual fixed overheads amounts to ₹ 25,36,000 and it is assumed to be occurred evenly throughout the year. The Company desires profit of ₹ 4,50,000 per quarter.

Closing stock is to be maintained at 20% of the budgeted sales.

Required:

(i) Calculate sales quantity to be sold during quarter ending 30-09-2017.

(ii) Prepare production budget in units for the quarter ending 30-09-2017. ***(8 Marks)***

Answer

(a) Workings

Statement Showing Computation of Standard Cost/Actual Cost/ Revised Actual Quantity

Input	Standard Cost			Actual Cost			Revised Actual Quantity [RAQ] (Kg.)	Std. Cost of Actual Qty. [AQ x SP] (₹)
	Quantity [SQ] (Kg.)	Price [SP] (₹)	Amount [SQ×SP] (₹)	Quantity [AQ] (Kg.)	Price [AP] (₹)	Amount [AQ×AP] (₹)		
Q	2,15,625 $\left(\frac{69,000kg.}{96\%}\times 3\right)$	18.00	38,81,250	2,21,000	18.10	40,00,100	2,10,000	39,78,000
R	5,03,125 $\left(\frac{69,000kg.}{96\%}\times 7\right)$	6.00	30,18,750	4,79,000	5.80	27,78,200	4,90,000	28,74,000
	7,18,750		69,00,000	7,00,000		67,78,300	7,00,000	68,52,000

Computation of Variances

Sales Price Variance = Actual Sales – Standard Sales

= AP × AQ – BP × AQ

Or

= AQ × (AP – BP)

= 71,000 kg × (₹ 203 – ₹ 200)

	=	₹ 2,13,000 (F)
Sales Volume Variance*	=	Standard Sales – Budgeted Sales
	=	BP × AQ – BP × BQ
		Or
	=	BP × (AQ – BQ)
	=	₹ 200 × (71,000 kg – 72,000 kg)
	=	₹ 2,00,000 (A)
Material Price Variance	=	Standard Cost of Actual Quantity – Actual Cost
	=	(SP × AQ) – (AP × AQ)
		Or
	=	(SP – AP) × AQ
Q	=	(₹ 18.00 – ₹ 18.10) × 2,21,000 kg
	=	₹ 22,100 (A)
R	=	(₹ 6.00 – ₹ 5.80) × 4,79,000 kg
	=	₹ 95,800 (F)
Total	=	₹ 22,100 (A) + ₹ 95,800 (F)
	=	₹ 73,700 (F)
Material Mix Variance	=	SP × (RAQ – AQ)
Q	=	₹ 18 × (2,10,000 kg. – 2,21,000 kg.)
	=	₹ 1,98,000 (A)
R	=	₹ 6 × (4,90,000 kg. – 4,79,000 kg.)
	=	₹ 66,000 (F)
Total	=	₹ 1,98,000 (A) + ₹ 66,000 (F)
	=	₹ 1,32,000 (A)
		Alternative
Material Mix Variance	=	Total Actual Quantity (units) × (*Average* Standard Price *per unit* of Standard Mix – Average Standard Price *per unit* of Actual Mix)
	=	$7,00,000 \text{ kg.} \times \left(\frac{Rs.69,00,000}{7,18,750 \text{ kg.}} - \frac{Rs.68,52,000}{7,00,000 \text{ kg.}} \right)$
	=	₹ 1,32,000 (A)

Material Yield Variance	=	SP × (SQ – RAQ)
Q	=	₹ 18 × (2,15,625 Kg. – 2,10,000 Kg)
	=	₹ 1,01,250 (F)
R	=	₹ 6 × (5,03,125 kg. – 4,90,000 kg.)
	=	₹ 78,750 (F)
Total	=	₹ 1,01,250 (F) + ₹ 78,750 (F)
	=	₹ 1,80,000 (F)

Alternative

Material Yield Variance	=	*Average* Standard Price *per unit* of Standard Mix × [Total Standard Quantity (units) – Total Actual Quantity (units)]
	=	$\left(\frac{\text{Rs.}69,00,000}{7,18,750\,\text{kg.}}\right)$ × (7,18,750 kg. – 7,00,000 kg.)
	=	₹1,80, 000 (F)
FO Expenditure Variance	=	Budgeted Fixed Overheads – Actual Fixed Overheads.
	=	₹ 5,60,000 – ₹ 5,08,000
	=	₹ 52,000 (F)
FO Volume Variance	=	Absorbed Fixed Overheads – Budgeted Fixed Overheads
	=	₹ 8 × 69,000 kg. – ₹ 5,60,000
	=	₹ 8,000 (A)

☞ **Sales Volume Variance*** *can also be computed on* ***margin basis****.*

(b) Workings

Statement Showing 'Sale Price and Contribution' ***per unit***

Particulars	Product – X (₹)	Product – Y (₹)
Selling Price (assumed)	X	Y
Direct Material	161	176
Direct Labour	75	90
Variable Overheads	30	50
Commission on Sales	X × 4%	Y × 5%

Contribution	…(i)	0.96 X – 266	0.95Y – 316
PVR	…(ii)	20%	16%
Selling Price	from (i) & (ii)	350	400
Contribution		70	64

Computation of Sales Quantity

Let 'K' be the Quantity of Product X.

Therefore, Quantity of Product Y = K × 3/5 = 0.6 K

Given, Annual Fixed Overheads = ₹25,36,000 *or* ₹ 6,34,000 per quarter;
Desired Profit = ₹4,50,000 per quarter.

Accordingly,

Desired Contribution = ₹6,34,000 + ₹ 4,50,000

= ₹10,84,000 *Or*

₹ 70 × K + ₹ 64 × 0.6 K = ₹10,84,000

Therefore K = 10,000 units

Sales Quantity of X = 10,000; Y = 6,000

Production Budget for Product X & Y

For the Quarter ending 30th September, 2017

Particulars	**'X' Units**	**'Y' Units**
Closing Stock at the end of the year	2,000 (10,000 × 20%)	1,200 (6,000 × 20%)
Budgeted Sales	10,000	6,000
Total Requirements	12,000	7,200
Less: Stock as on 01-07-2017	1,400	1,050
Production	10,600	6,150

Question 6

(a) ABC miners operates two divisions, one in Japan and other in United Kingdom (U.K.). Mining Division is operated in Japan which is rich in raw emerald.

The other division is United Kingdom Processing Division. It processes the raw emerald into polished stone fit for human wearing.

The cost details of these divisions are as follows:

Division	Japan Mining Division	United Kingdom Processing Division
	Per carat of raw emerald	Per carat of polished emerald
Variable Cost	2,500 Yen	150 Pound
Fixed Cost	5,000 Yen	350 Pound

Several polishing companies in Japan buy raw emerald from other local Mining Companies at 9,000 Yen per carat. Current Foreign Exchange Rate is 50 yen = 1 Pound. Income Tax rates are 20% and 30% in Japan and the United Kingdom respectively.

It takes 2 carats of Raw Yellow emerald to yield 1 carat of Polished Stone. Polished emerald sell for 3,000 Pounds per carat.

Required:

(i) Compute the transfer price for 1 carat of raw emerald transferred from Mining Division to the Processing Division under two methods - (a) 200% of Full Costs and (b) Market Price.

(ii) 1,000 carats of raw emerald are mined by the Japan Mining Division and then processed and sold by the U.K. Processing Division. Compute the after tax operating income for each division under both the Transfer Pricing Methods stated above in (i).

(8 Marks)

(b) JC Company produces electronic product and factory is working in Special Economic Zone (SEZ). The expected capacity utilization is 60% and turnover for the year 2016-17 is ₹660 lakh. If the company works at 100% capacity, the sales cost relationship will be as follows:

Factory cost : 65 per cent of sales value

Prime cost : 75 per cent of factory cost

Selling and administrative cost : 20% of sales value and being 80% variable

The factory overheads will vary according to operating capacity in the following manner:

Operating capacity	60%	80%	100%	120%
Factory overheads (` in lakhs)	155.25	164.00	178.75	214.50

The Government of India gives 10% subsidy on the export order amount and it is expected that currency fluctuation trends will be positive by 8% in next financial year.

The Company receives an offer from abroad for a value of ₹150 lakhs. The prime cost of this order is estimated at ₹96 lakhs and selling and administrative expenses applicable to this order is ₹7,20,000. The order will occupy 40% of the capacity of the plant. To complete the export order, quality maintenance cost of ₹1,20,000 will also be incurred.

The Marketing Director estimates that the company's own sales will increase to 80% of the capacity by the time of materialization of new order. The factory overheads will increase by ₹ 50.50 lakhs (for increase from 80% to 120% capacity).

The maximum demand in local market can be extended up to 120% with export order. The export order cannot accepted partly.

Required:

(i) Prepared a profitability statement at the capacity level of 60% 80% and 100%.

(ii) Should the company accept the export order? ***(8 Marks)***

Answer

(a) (i) Transfer Price: 200% of Full Cost Basis

= 200% of (¥ 2,500 + ¥ 5,000)

= ¥ 15,000 or £300 (¥ 15,000/ 50)

Transfer Price: Market Price Basis

= ¥ 9,000 or £180 (¥ 9,000/ 50)

(ii) Statement Showing "Operating Income"

Particulars	Japan Mining Division		UK Processing Division	
	Transfer Price		Transfer Price	
	¥15,000	¥9,000	£300	£180
Selling Price (Polished Stone)	---	---	£3,000	£3,000
Transfer Price (Raw Emerald)	¥ 15,000	¥ 9,000	---	---
Raw Emerald	---	---	£600 (£300 × 2)	£360 (£180 × 2)
Variable Cost	¥ 2,500	¥ 2,500	£150	£150
Fixed Cost	¥ 5,000	¥ 5,000	£350	£350
Profit Before Tax	¥ 7,500	¥ 1,500	£1,900	£2,140
Less: Tax 20%/ 30%	¥ 1,500	¥ 300	£570	£642
Profit After Tax per Carat of Raw Emerald	¥ 6,000	¥ 1,200	£1,330	£1,498
Raw Emerald	1,000 Carats	1,000 Carats	500 Carats	500 Carats
Total Profit	¥ 60,00,000	¥ 12,00,000	£6,65,000	£7,49,000
	Or	***Or***		
Total Profit (£)	£1,20,000	£24,000	£6,65,000	£7,49,000

(b) (i) **Profitability Statement**

Particulars	60% Capacity (₹ 'lakhs)	80% Capacity (₹ 'lakhs)	100% Capacity (₹ 'lakhs)	120% Capacity (₹ 'lakhs)
Sales	660.00	880.00	1,100.00	880.00
Export Sales	---	---	---	150.00
Subsidy	---	---	---	15.00 (10% × 150)
Impact of Currency Fluctuation	---	---	---	12.00 (8% × 150)
Revenue …(A)	660.00	880.00	1,100.00	1,057.00
Prime Cost	321.75 (60% × 536.25)	429.00 (80% × 536.25)	536.25 (75% × 715)	525.00 {(80% × 536.25) +96}
Add: Factory Overheads	155.25	164.00	178.75	214.50
Add: Quality Maintenance Cost	---	---	---	1.20
Factory Cost	477.00	593.00	715.00 (65% × 1,100)	740.70
Add: Selling and Administrative Cost				
-Fixed	44.00	44.00	44.00 (20%×20% ×1,100)	44.00
-Variable	105.60 (60% × 176.00)	140.80 (80% × 176.00)	176.00 (20%×80% ×1,100)	148.00 {(80%× 176.00)+7.2}
Cost of Sales …(B)	626.60	777.80	935.00	932.70
Operating Profit	33.40	102.20	165.00	124.30

(ii) The above computations show that JC Company should **accept the export order** since its acceptance would increase the operating profit of the concern by ₹ 22.1 lakhs (₹ 124.30 lakhs - ₹ 102.20 lakhs).

Question 7

Answer any **Four** out of the following **Five** questions:

(a) (i) Define Pricing Strategy

(ii) *State the Market Entry Strategies of pricing applicable in the following situations:*

(1) *Inelastic demand*

(2) *Mass Production*

(3) *Assured profit*

(4) *Elastic demand*

(b) *Explain the following terms in relation to Simplex method of Linear Programming problem:*

(i) *Multiple optimal solution*

(ii) *Infeasible solution*

(iii) *Degeneracy*

(iv) *Unbounded solution*

(c) *Identify the type of cost in each of the following independent situations. Also state whether it is relevant or irrelevant.*

(i) *A company has invested ₹ 50 lakh in a project. Company could have earned ₹ 4 lakh by investing the amount in Government securities.*

(ii) *Company has purchased a new machine for ₹ 50 lakh and entered into three year maintenance contract at ₹ 25,000 per year.*

(iii) *A special drilling machine has to be hired on monthly charges of ₹ 50,000 for two months for the Construction project.*

(iv) *There are 15 skilled workers in the production department of X Ltd. currently underutilized. It is the policy of the company to continue to pay skilled workers at ₹ 15,000 month in full. Acceptance of the new project will reduce the idle time of skilled workers.*

(d) *State with reason whether the following statements are true or false in relation to assignment problem:*

(i) *There cannot be multiple optimal solutions in an assignment problem.*

(ii) *In 4 × 6 minimisation problem, we can solve it by introducing one dummy row in given matrix.*

(iii) *In a problem relating to sales maximization, we have to convert the given matrix into minimization by subtracting lowest element among all the elements of given matrix from all the elements of that matrix.*

(iv) *When there is a restriction of assignment in a particular cell, then we put M to avoid assignment in that cell.*

(e) *Classify the following items under appropriate categories of quality costs viz. Prevention cost, Appraisal cost, Internal failure cost and External failure cost.*

(i) Re-inspection of product reworked.

(ii) Testing of material of special nature from outside laboratory.

(iii) Employee time spent on reviewing and assessing the quality of output regarding material supplied.

(iv) Customer survey for assessing the feedback on quality of product sold.

(v) Calibration of testing equipment

(vi) Warranty claim processing

(vii) Repurchase of components to create replacements

(viii) Loss of customer due to supply of low quality product. ***(4 × 4 = 16 Marks)***

Answer

(a) (i) Pricing strategy is defined as a broad plan of action by which an organisation intends to reach its goal. Some illustrative strategies are:

- Expanding product lines that enjoy substantial brand equity.
- Offer quantity discounts to achieve increase in sales volume.

(ii)

Sl. No.	Situation	Pricing Strategy
(i)	Inelastic Demand	Skimming Pricing
(ii)	Mass Production	Penetration Pricing
(iii)	Assured Profit	Skimming Pricing
(iv)	Elastic Demand	Penetration Pricing

(b) (i) Multiple Optimal Solution: In final simplex table, if the value of $C_j - Z_j$ *for non- basic variable is zero*, then an alternative optimum solution exists.

(ii) Infeasible Solution: Infeasible Solution exist when one or more *artificial variable remains basic variable* in the final simplex table.

(iii) Degeneracy: When there is a *tie in minimum/ replacement ratio column* for choosing departing variable, degeneracy arises.

(iv) Unbounded Solution: When in the simplex table, minimum ratio column contains infinite or negative, then the solution is unbounded as it is *impossible to decide the departing variable*.

(c)

(i)	₹ 50 lakh is Sunk Cost and Irrelevant; ₹ 4 lakh is Opportunity Cost and Relevant.
(ii)	₹ 50 lakh is Sunk Cost and Irrelevant; ₹ 25,000 p.a. is Committed Cost and Irrelevant.

(iii)	₹ 50,000 p.m. is Incremental/ Out of Pocket Cost and Relevant
(iv)	₹ 15,000 p.m. is Committed Cost and Irrelevant

(d)

S.No.	True/ False	Reason
(i)	False	An Assignment problem can have more than one optimal solution, which is called multiple optimal solutions. *Multiple zeros in all columns and rows are indicative of multiple optimal solutions.*
(ii)	False	To solve an assignment problem, the order of matrix should be equal. An unbalanced problem has to be balanced first by introducing the *required number of dummy workers/ jobs.* A 4 × 6 minimization problem can be solved by introducing 2 dummy rows.
(iii)	False	To solve an assignment problem whose objective is to maximize revenue, the matrix has to be converted into *loss matrix* by *subtracting all the elements of the given matrix from the highest element of the matrix*.
(iv)	True	To avoid assignment in a restricted cell of a matrix, the cell is assigned **M**. **M** represents *very high* or *infinite value*. Throughout the solution steps, M does not change. Since **M** is infinity, no assignment is possible in **M.**

(e)

S No.	Item of Cost	Classification
(i)	Re inspection pf product of product reworked	Internal Failure Cost
(ii)	Testing of material of special nature from outside laboratory	Appraisal Cost
(iii)	Employee time spent on reviewing and assessing the quality of output regarding material supplied	Prevention Cost/ Appraisal Cost
(iv)	Customer survey for assessing the feedback on quality of product sold	Prevention Cost/ Appraisal Cost
(v)	Calibration of testing equipment	Prevention Cost/ Appraisal Cost
(vi)	Warranty claim processing	External Failure cost
(vii)	Repurchase of components to create replacements	Internal Failure cost
(viii)	Loss of customer due to supply of low quality product	External Failure Cost