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.

Question 1

(a) PS Limited has two production departments - Machine shop and packaging. The maximum available capacity in these departments are 42,000 hours and 32,500 hours respectively. The Company wishes to produce two products X and Y. One unit of product X requires 4 hours of machine shop and 3 hours of packaging while each unit of product Y needs 2.5 hours of machine shop and 2 hours of packaging. The cost structure is as follows:

	X (₹)	***Y (₹)***
Material cost per unit	*90*	*125*
Labour cost per unit	*50*	*75*
Variable overheads per unit	*35*	*50*
Selling price per unit	*250*	*375*

The sales department of the Company is also geared to sell all that is produced at existing prices.

You are required to:

(i) advise about the best possible production programme under the circumstances

(ii) calculate combined P/V Ratio ***(5 Marks)***

(b) A company has sales of 1,00,000 units at a price of ₹ 150 per unit and profit of ₹ 30 lakhs in the current year. Due to stiff competition, the company has to reduce its price of product next year by 8% to achieve same volume of sales as in the current year. The cost structure and profit for the current year is given below:

Particulars	***(₹ Lakhs)***
Direct material	*50*
Direct wages	*30*
Variable factory overhead	*15*
Fixed overheads including Sales & Admin. Expenses	*25*
Total cost	***120***

To achieve the target cost to maintain the same profit, the company is evaluating the proposal to reduce the labour cost and fixed factory overhead. A vendor supplying the machine suitable for the company's operations has offered an advanced technology semi-automatic machine of ₹ 10 lakhs as replacement of old machine worth ₹ 3 lakhs. The vendor is agreeable to take back the old machine at ₹ 2.25 lakhs only. The company's policy is to charge depreciation at 10% on WDV. The maintenance charge of the existing machine is ₹ 0.80 lakhs per annum whereas there will be warranty of services .free of cost for the new machine for first two years. There are 9 supervisors whose salary is ₹ 1.20 lakhs each per annum. The new machine having conveyor belt is expected to help in cost cutting measures in the following ways:

(1) Improve productivity of workers by 25%.

(2) Cut down material wastage by 1%.

(3) Elimination of services of supervisors because of automatic facilities of the machine.

(4) Saving of packaging cost by ₹ 1.35 lakhs.

Assuming cost of capital to be 12%, calculate how many supervisors should be removed from the production activities to achieve the target cost. ***(5 Marks)***

(c) A company manufactures fire fighting equipment for industrial use. They have been asked to bid on a prospective contract for 180 of such equipment. They have just completed an initial run of 60 of this equipment at the following costs:

	₹
Direct material	*40,000*
Direct labour (12,000 hours at ₹ 4)	*48,000*
Tooling cost (Reusable)	*6,000*
Variable overheads (₹ 0.50 per labour hour)	*6,000*
Fixed overhead (₹ 0.50 per labour hour)	*12,000*
Total	***1,12,000***

A 90% learning curve is thought to be pertinent in this case. The marketing manager believes that the quotation is unlikely to be accepted if it exceeds ₹ 2,50,000 and as the company is short of work, he believes the contract to be vital.

Comment whether it is worth accepting at ₹ 2,50,000. ***(5 Marks)***

(d) A travel agency has collected the following data on the demand for eight-seater cars over the past 30 days in a month:

Daily Demand of Cars	*3*	*4*	*5*	*6*	*7*
No. of days	*3*	*9*	*9*	*6*	*3*

The agency has only 5 cars at present.

You are required:

(i) To generate 6 days of demand for the travel agency by using the following 6 random numbers:

70, 35, 90, 06, 56 and 96.

(ii) What is the average number of cars rented per day for the 6 days?

(iii) How many rentals will be lost over the 6 days? ***(5 Marks)***

Answer

(a) (i) Contribution Analysis

Particulars	X	Y
	(₹)	(₹)
Selling Price *per unit* ...(A)	250	375
Variable Costs *per unit*:		
Materials	90	125
Labour	50	75
Variable Overheads	35	50
Total Variable Costs ...(B)	175	250
Contribution ...(A − B)	75	125

Let x be the units to be produced of product X and y be the units to be produced of product Y.

LP Problem formulation:

Maximize

$Z = 75x + 125y$ (Maximization of contribution)

Subject to the Constraints:

$4x + 2.5y \leq 42,000$ (Machine Shop hrs. constraint)

$3x + 2y \leq 32,500$ (Packaging hrs. constraint)

$x, y \geq 0$ (Non- negativity constraint)

Evaluation of Points

Products (Units)		Contribution (₹) (Z = 75x + 125y)	Machine Shop 42,000hrs.	Packaging 32,500 hrs.	Remark
X	Y				
0	16,800	21,00,000	42,000	33,600 ×	Not Feasible

10,500	0	7,87,500	42,000	31,500	
10,833	0	8,12,475	43,332 ×	32,499	Not Feasible
0	16,250	**20,31,250**	40,625	32,500	Optimum Product Mix
5,500	8,000	14,12,500	42,000	32,500	

Optimal Product Mix is X=0 and Y= 16,250 units

(ii) Combined PV Ratio

$$= \frac{₹375 - ₹250}{₹375} \times 100$$

= 33.33%

(b) For the same quantity, sales value will reduce by 8% of (1,00,000 units × ₹ 150) = ₹ 12 lakhs. For maintaining the same amount of profit, cost also has to be reduced by ₹ 12 lakhs, which can be achieved as under –

Particulars	**₹ in lakhs**
Savings: Reduction in Wages (Due to higher labour productivity, wages will be 30/1.25 = ₹ 24.00 lakhs)	6.00
Elimination of Wastage of Materials = 1% of ₹ 50 lakhs	0.50
Savings in Packaging Cost (given)	1.35
Savings in Maintenance Cost (given)	0.80
Sub-Total Savings …(A)	8.65
Loss in Disposal of Old Machine (₹3 lakhs – ₹2.25 lakhs)	0.75
Difference in Depreciation (₹10 lakhs – ₹3 lakhs) × 10%	0.70
Cost of Capital Investment (₹10 lakhs × 12%)	1.20
Sub-Total Costs …(B)	2.65
Effective Cost Reduction before considering removal of supervisors …(A) – (B)	6.00
Additional reduction required for meeting Target Cost, by removing supervisors (₹12 lakhs – ₹6 lakhs)	6.00

Hence,

Number of Supervisors to be Removed = ₹6 lakhs / ₹1.20 lakhs = 5 Supervisors

(c) Statement Showing Cost of 180 Equipment

	(₹) 60 Equipment 1 Batch	(₹) 240 Equipment 4 Batches	(₹) Prospective Contract 180 Equipment
Direct Material	40,000	1,60,000	1,20,000
Direct Labour	48,000	**1,55,520**[$]	**1,07,520**
Tooling Cost	6,000	6,000	---
Variable Overheads	6,000	**19,440**[#]	**13,440**
	1,00,000	3,40,960	2,40,960

[$] *(12,000 hrs. × 0.90 × 0.90 × 4 batches × ₹4.00);* [#] *(12,000 hrs. × 0.90 × 0.90 × 4 batches × ₹0.50)*

Contract should be accepted since offer is of ₹2,50,000 in relation to incremental cost of ₹2,40,960.

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It has been considered that the first run (one batch = 60 units) has simply made without customer's demand *for some other purpose* and the next 3 batches are considered for the prospective customer.

(d) (i) Random Allocation Table

Daily Demand	Days	Probability	Cumulative Probability	Random No. Assigned
3	3	0.10	0.10	00 – 09
4	9	0.30	0.40	10 – 39
5	9	0.30	0.70	40 – 69
6	6	0.20	0.90	70 – 89
7	3	0.10	1.00	90 – 99

Simulation of Trials

Day	Random No.	Demand	No. of Cars on Rent	Rent Lost
1	70	6	5	1
2	35	4	4	---
3	90	7	5	2
4	06	3	3	---
5	56	5	5	---
6	96	7	5	2
Total		32	27	**5**

(ii) Average no. of Cars Rented are **4.5** $\left(\frac{27\text{Cars}}{6}\right)$ or **5** or **4 Cars**

(iii) Rental Lost equals to **5 Cars**

Question 2

(a) Mercury Ltd. has prepared the following budget estimates for the year 2017-18.

	Product X ₹/unit	***Product Y ₹/unit***
Sales (units)	*6,000*	*16,000*
Selling price	*400*	*640*
Direct materials	*120*	*220*
Direct wages@ ₹10/- per hour	*80*	*120*
Variable overheads	*40*	*60*
Fixed overheads	*80*	*120*
Total	*320*	*520*
Profit	*80*	*120*

After installation of the above manufacturing programme, it is observed that 1/4th capacity of the company is still idle. In order to improve the working, the following proposals are put up for consideration:

(1) Discontinue Product X and the capacity so released will be used on Product Y. The selling price of Product Y however will be reduced by ₹ 20/- per unit on the entire sales due to increased volume of sales.

(2) Discontinue Product Y and divert the capacity so released to the production of Product Z whose unit cost data is as under:

Selling price	*₹520*
Direct materials	*₹150*
Direct labour @ ₹10/- per hour	*₹100*
Variable overheads	*₹50*

(i) Prepare a statement showing profitability as envisaged in the original programme.

(ii) Evaluate each of the above proposals independently and present statements showing overall profitability under each proposal.

Show the amount in Lakhs of Rupees. ***(8 Marks)***

(b) A PWD (Public Works Department) has decided to carry out repairs on four major bridges in the state. The government has sanctioned a grant of ₹ 114 lakhs towards the cost with the condition that the repairs should be carried out at lowest cost. Five contractors have sent in their bids. Only one bridge will be awarded to one contractor. The bids are given below:

		Cost of repairs (₹ in lakhs)			
Bridge →		B1	B2	B3	B4
Contractor	C1	18	28	38	30
	C2	14	34	40	39
	C3	18	36	42	38
	C4	20	24	36	36
	C5	20	30	42	32

You are informed that C1 should get B1 and C5 should get B2 to minimise costs.

(i) What is the minimum cost allocation?

(ii) How much is the minimum discount that the eliminated contractor should offer for meriting a contract?

(iii) Independent of (ii) above, if the department can negotiate to get a uniform discount rate from each contractor, what is the minimum rate of discount so that the cost is within the sanctioned amount? ***(8 Marks)***

Answer

(a) Statement Showing Contribution (₹/u)

Particulars	X	Y	Z
Selling Price	400	640	520
Less: Direct Materials	120	220	150
Less: Direct Wages	80 (8 hrs. × ₹10)	120 (12 hrs. × ₹10)	100 (10 hrs. × ₹10)
Less: Variable Overheads	40	60	50
Contribution	160	240	220

(i) & (ii) Statement Showing Overall Profitability

Particulars	Original Program	Proposal (1)	Proposal (2)
Sales (units)			
X	6,000	---	6,000

Y	16,000	**20,000**[$]	---
Z	---	---	**19,200**[#]
	(lakhs of ₹)	(lakhs of ₹)	(lakhs of ₹)
Contribution			
X (6,000 units × ₹160/ 1,00,000)	**9.60**	---	9.60
Y (16,000 units × ₹240/ 1,00,000) (20,000 units × ₹220/ 1,00,000)	**38.40**	44.00	---
Z (19,200 units × ₹220/ 1,00,000)	---	---	42.24
Total Contribution	**48.00**	**44.00**	**51.84**
Less: Fixed Overheads[@]	24.00	24.00	24.00
Profit	24.00	20.00	27.84

[$] (16,000 units + 8,000 hrs.× 6 hrs. /12 hrs.); [#] (16,000 hrs. × 12 hrs./10 hrs.);

[@] [(6,000 units × ₹80 + 16,000 units × ₹120)/1,00,000]

Conclusion: Produce Z instead of Y to maximise profits

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Capacity has been utilized to the extent **capacity so released** from the discontinuance of the Products (X or Y) in respective proposals.

(b) (i) Balancing the problem and assigning C1 → B1 and C5 →B2, we have the Cost Table

Contractors	B3	B4	Dummy
C2	40	39	0
C3	42	38	0
C4	36	36	0

As there is a zero in each row, we go straight to the column reduction-

Contractors	B3	B4	Dummy
C2	4	3	0
C3	6	2	0
C4	0	0	0

The minimum number of lines to cover all zeros is 2, which is less than 3, the order of the square matrix. Hence, the above matrix will not provide the optimal solution. Thus, we try to increase the number of zeros.

Contractors	B3	B4	Dummy
C2	4	3	0
C3	6	2	0
C4	0	0	0

Select the minimum uncovered element by these lines (which is 2). Subtract it from all the uncovered elements and add it to the elements lying on the intersection of lines, as drawn above. The revised matrix will be-

Contractors	B3	B4	Dummy
C2	2	1	0
C3	4	0	0
C4	0	0	2

As the minimum number of lines to cover all zeros is 3, which is equal to the order of the square matrix, the below matrix will provide the optimal solution. The assignment is made below-

Contractors	B3	B4	Dummy
C2	2	1	0
C3	4	0	0
C4	0	0	2

The Optimal Assignment is-

Contractor	Bridge	Cost (₹ in Lakhs)
C1	B1	18
C2	**No Assignment**	**×**
C3	B4	38
C4	B3	36
C5	B2	30

Hence, total minimum cost of the repair project will be ₹122 Lakhs.

(ii) The **Contractor C2** must offer the minimum discount of **₹1 lakhs** (₹39 lakhs - ₹38 lakhs) *for meriting contract B4* (equal to C3)

Or

the minimum discount of **₹4 lakhs** (₹40 lakhs - ₹36 lakhs) *for meriting contract B3* (equal to C4).

(iii) Uniform Discount Rate $= \frac{₹122 - ₹114}{₹122} \times 100$

$= \mathbf{6.56\%}$

Question 3

(a) Compute the missing data indicated by the question marks from the following information:

Particulars	*Product X*	*Product Y*
Standard wages rate per hour	*₹40*	*₹50*
Actual wages paid	*₹45,000*	*₹66,240*
Standard Labour hours	*?*	*1,400*
Actual Labour hours	*900*	*?*
Labour Cost Variance (LCV)	*?*	*?*
Labour Rate Variance (LRV)	*?*	*₹2,760(F)*
Labour Efficiency Variance (LEV)	*?*	*?*
Labour Gang (Mix) Variance	*₹2,000 (F)*	*?*

(8 Marks)

(b) Care n Cure, a day care health centre covered under insurance plan receives payment from the insurance company each time any patient attends the centre for consultation as under:

Consultation involving	*Payment from Insurance Company (₹)*
Bandaging	*80*
Plastering	*300*
Rehabilitation	*600*

In addition, the adult patients will have to make co-payment for Plastering and Rehabilitation which is at the same rate of payment by insurance company for respective category of treatment made. Senior citizens are required to make co-payment for Rehabilitation only to the extent of 50% of the payment by insurance company for that category.

The health centre will remain open for 6 days a week for 52 weeks in a year. Each physician treated 10 patients per day.

The health centre received a fixed income of ₹6,05,200 per annum for promotion of health products from the manufacturers.

The annual expenditure of the health centre is estimated as under:

	₹
Materials and Consumables (100% variable)	*7,64,000*
Staff salaries per annum per Employee (Fixed):	
Physician	*4,00,000*
Assistant	*1,50,000*
Administrative Staff	*90,000*
Establishment and other operating cost (Fixed)	*6,00,000*
The non-financial information is as under:	
(1) Staff:	
Physician	*5*
Assistant	*6*
Administrative Staff	*2*
(2) Patient Mix:	
Adult	*50%*
Children	*30%*
Senior citizens	*20%*
(3) Mix of patient Appointment (%):	
Bandaging	*60%*
Plastering	*30%*
Rehabilitation	*10%*

(i) Calculate the net income of Care-n-Cure (the day care health centre) for the next year.

(ii) Determine the number of patients to break-even.

Show amount to the nearest rupee. ***(8 Marks)***

Answer

(a) Workings

Standard Cost and Actual Cost (Incomplete Information)

	Standard Data			Actual Data		
	Hrs. [SH]	Rate (₹) [SR]	Amount (₹) [SH x SR]	Hrs. [AH]	Price (₹) [AR]	Amount (₹) [AH × AR]
X	? ??	40	? ? ?	900	50	45,000

					(₹45,000/ 900hrs.)	
Y	1,400	50	70,000	???	? ? ?	66,240
Total	? ? ?		? ??	? ??		? ? ?

W.N.1

Labour Rate Variance (Y) = Standard Cost of Actual Time – Actual Cost

⇒ ₹2,760 (F) = Actual Hours × ₹ 50 – Actual Cost

⇒ ₹2,760 (F) = Actual Hours × ₹ 50 – ₹ 66,240

⇒ Actual Hours (Y) = 1,380 Hrs.

W.N.2

Gang Variance (X) = Standard Cost of Actual Time *Worked* in Standard Proportion – Standard Cost of Actual Time Worked

Or = Revised Actual Hours × Standard Rate – Actual Hours × Standard Rate

Or = Standard Rate × (Revised Actual Hours – Actual Hours)

⇒ ₹2,000 (F) = $₹40 \times \left(2,280 \times \frac{\text{Std.Hrs.X}}{\text{Std.Hrs.X} + 1,400} - 900\text{hrs.}\right)$

⇒ Std. Hrs. (X) = 1,000 Hrs.

Standard Cost and Actual Cost

	Standard Data			Actual Data		
	Hrs. [SH]	**Rate (₹) [SR]**	**Amount (₹) [SH × SR]**	**Hrs. [AH]**	**Price (₹) [AR]**	**Amount (₹) [AH × AR]**
X	1,000 (W.N.2)	40	40,000	900	50	45,000
Y	1,400	50	70,000	1,380 (W.N.1)	48 (₹66,240/ 1,380hrs.)	66,240
Total	2,400		1,10,000	2,280		1,11,240

Computation of Variances

Labour Cost Variance = Standard Cost – Actual Cost

= (SH × SR) – (AH × AR)

X = ₹40,000 – ₹45,000

= ₹5,000 (A)

Y = ₹70,000 – ₹66,240

= **₹3,760 (F)**

Labour Rate Variance = Standard Cost of Actual Time – Actual Cost

= (SR × AH) – (AR × AH)

Or

= (SR – AR) × AH

X = (₹40 – ₹50) × 900 hrs.

= **₹9,000 (A)**

Labour Efficiency Variance

= Standard Cost of Standard Time for Actual Production – Standard Cost of Actual Time

= (SH × SR) – (AH × SR)

Or

= (SH – AH) × SR

X = (1,000 hrs. – 900 hrs.) × ₹40

= **₹4,000 (F)**

Y = (1,400 hrs. – 1,380 hrs.) × ₹50

= **₹1,000 (F)**

Gang Variance = Standard Cost of Actual Time *Worked* in Standard Proportion – Standard Cost of Actual Time Worked

Or

= Revised Actual Hours × Standard Rate – Actual Hours × Standard Rate

Or

= Standard Rate × (Revised Actual Hours - Actual Hours)

Y = $₹50 \times \left(2,280 \times \frac{1,400}{1,000+1,400} - 1,380\text{hrs.}\right)$

= **₹2,500 (A)**

(b) (i) Statement Showing Net Income of Care n Cure

		(₹)	(₹)
Payment from Insurance Companies		30,88,800	
Co-payment from Senior Citizens		93,600	
Co-payment from Adult Patients		11,70,000	43,52,400
Other Income (Fixed)			6,05,200
Total Income		(A)	49,57,600
Less: Variable Expenses:			
Material and Consumables			7,64,000
Less: Fixed Expenses:			
Physician's Salary (5 × 4,00,000)		20,00,000	
Assistants Salary (6 × 1,50,000)		9,00,000	
Administrative Staff's Salary (2 × 90,000)		1,80,000	
Establishment and Other Operating Costs		6,00,000	36,80,000
Total Expenditure		(B)	44,44,000
Net Income		(A − B)	5,13,600

Workings

(1) Total Number of Patients Attended

Number of Patients Attended *per Day* by a Physician	10
Number of Physicians Employed	5
Number of Days in Week	6
Number of Weeks in a Year	52
Total Number of Patients Attended (10 × 5 × 6 × 52)	15,600

(2) Patient Mix

Adults (50%)	[15,600 × 50/100]	7,800
Children (30%)	[15,600 × 30/100]	4,680
Senior Citizens (20%)	[15,600 × 20/100]	3,120
Total		15,600

(3) Patient Appointments

Bandaging (60%)	[15,600 × 60/100]	9,360
Plastering (30%)	[15,600 × 30/100]	4,680

Rehabilitation (10%)	[15,600 × 10/100]	1,560
Total		15,600

(4) Income from Insurance Companies

	Number of Patients (A)	(₹) (B)	(₹) (A × B)
Bandaging (60%)	9,360	80	7,48,800
Plastering (30%)	4,680	300	14,04,000
Rehabilitation (10%)	1,560	600	9,36,000
Total			30,88,800

(5) Co-payment from Adult Patients

Total Number of Adult Patients = 7,800

	Number of Patients	Payment (₹)	Total Payment (₹)
Bandaging (60%)	4,680	-	-
Plastering (30%)	2,340	300	7,02,000
Rehabilitation (10%)	780	600	4,68,000
Total			11,70,000

Total Number of Senior Citizens = 3,120

	Number of Patients	Payment (₹)	Total Payment (₹)
Bandaging (60%)	1,872	-	-
Plastering (30%)	936	-	-
Rehabilitation (10%)	312	300	93,600
Total			93,600

(ii) Number of Patients for Break-even

	(₹)
Fixed Costs	36,80,000
Less: Fixed Income	6,05,200
Net Fixed Costs	30,74,800
Break-even Patients $\left(\frac{₹30,74,800}{₹230.03}\right)$	13,367

Workings

Statement Showing Contribution Analysis

	(₹)
Total Fees from Insurance Companies, Adult Patients & Sr. Citizens	43,52,400
Less: Variable Costs	7,64,000
Contribution	35,88,400
Average Contribution *per patient* $\left(\frac{₹35,88,400}{15,600 \text{ Patients}}\right)$	230.03

Question 4

(a) Apna Paridhan Limited is engaged in production of three types of baby suits: Baby; Babu and Superman. During the year ended 31st March, 2018 the company produced and sold 80,000 Baby suits, 48,000 Babu suits and 36,000 Superman suits. The cost details are as follows:

(i) Per unit Material and Labour Costs:

	Baby (₹)	*Babu (₹)*	*Superman (₹)*
Material	*120*	*180*	*260*
Labour @ ₹60 per hour	*150*	*195*	*270*

(ii) Overheads:

Activity Cost Pool	*Associated Cost (₹)*
Purchasing Section	*20,30,200*
Machine Setup	*39,65,000*
Delivery Section	*31,50,000*
Labour amenities & Welfare	*77,70,000*
Customer Support	*38,04,800*

You are required to calculate total cost per suit for each type of suits by using:

(i) Traditional Costing System if the overheads are charged on Direct Labour Hour Rate basis.

(ii) Activity Based Costing System if the additional information required under this system is as given below:

Activity Cost Pool	*Cost Driver*	*Activity utilized*		
		Baby Suits	*Babu Suits*	*Superman Suits*
Purchasing Section	*No. of purchase orders*	*400*	*250*	*350*
Machine Setup	*Production Runs*	*1,100*	*750*	*1,200*
Delivery Section	*No. of Deliveries*	*700*	*440*	*960*
Labour amenities & Welfare	*Direct Labour Hours*	-	-	-
Customer Support	*Sales Units*	-	-	-

Show calculation of amount up to two decimal points. ***(10 Marks)***

(b) PRS Limited is normally manufacturing 50,000 units of its product 'Sewda Beauty' in a year. The cost structure at this level is as follows:

(₹ in Lakhs)

	₹
Materials	*45*
Labour	*35*
Manufacturing Overheads	*20 (75% Variable)*
Administrative Overheads	*10 (80% Fixed)*
Selling & Distribution Overheads	*06 (50% Fixed)*
Total	*116*

Due to adverse trade conditions, the company expected that only 10,000 units of 'Sewda Beauty' can be sold at a price of ₹ 250/- per unit, during the next year. The Board of Directors plans to shut down the plant. In this situation the fixed costs for next year is expected to be reduced by 60% and additional costs of shut down are expected at ₹ 2,00,000. Should the plant be shut down? What is the shut down point?

Show amount to the nearest rupee. ***(6 Marks)***

Answer

(a) (i) Statement Showing "Computation of Cost of Product"

(Based on the Traditional Costing System- Direct Labour Hour Rate)

	Baby Suits (₹/u)	Babu Suits (₹/u)	Superman Suits (₹/u)
Materials Cost	120	180	260

Labour Cost	150 (2.50 hrs. × ₹60)	195 (3.25 hrs. × ₹60)	270 (4.50 hrs. × ₹60)
Overheads (Refer to W.N. 1)	100 (2.50 hrs. × ₹40)	130 (3.25 hrs. × ₹40)	180 (4.50 hrs. × ₹40)
Total Cost	**370**	**505**	**710**

W.N.1

Overhead Rate per Labour Hour

$$= \frac{\text{Total Overhead Incurred}}{\text{Total Direct Labour Hours}}$$

$$= \frac{₹20,30,200+₹39,65,000+₹31,50,000+₹77,70,000+₹38,04,800}{(2.50\ \text{hrs.}\times 80,000)+(3.25\ \text{hrs.}\times 48,000)+(4.50\ \text{hrs.}\times 36,000)}$$

= ₹40.00 *per labour hour*

(ii) Statement Showing "Computation of Cost of Product"

(Based on the Activity Based Costing System)

	Baby Suits (₹/u)	Babu Suits (₹/u)	Superman Suits (₹/u)
Materials Cost	120	180	260
Labour Cost	150 (2.50 hours × ₹60)	195 (3.25 hours × ₹60)	270 (4.50 hours × ₹60)
Overheads (Refer to W.N. 2)	101.85	116.59	193.77
Total Cost	**371.85**	**491.59**	**723.77**

W.N.2

Overhead Cost per unit under Activity Based Costing

Activity Cost Pool	Baby Suits (₹)	Babu Suits (₹)	Superman Suits (₹)
Purchase Section	8,12,080 $\left[\frac{400}{1,000}\times ₹20,30,200\right]$	5,07,550 $\left[\frac{250}{1,000}\times ₹20,30,200\right]$	7,10,570 $\left[\frac{350}{1,000}\times ₹20,30,200\right]$
Machine Setup	14,30,000 $\left[\frac{1,100}{3,050}\times ₹39,65,000\right]$	9,75,000 $\left[\frac{750}{3,050}\times ₹39,65,000\right]$	15,60,000 $\left[\frac{1,200}{3,050}\times ₹39,65,000\right]$

Activity Cost Pool	Baby Suits (₹)	Babu Suits (₹)	Superman Suits (₹)
Delivery Section	10,50,000 $\left[\frac{700}{2,100} \times ₹31,50,000\right]$	6,60,000 $\left[\frac{440}{2,100} \times ₹31,50,000\right]$	14,40,000 $\left[\frac{960}{2,100} \times ₹31,50,000\right]$
Labour Amenities & Welfare	30,00,000 $\left[\frac{2,00,000}{5,18,000} \times ₹77,70,000\right]$	23,40,000 $\left[\frac{1,56,000}{5,18,000} \times ₹77,70,000\right]$	24,30,000 $\left[\frac{1,62,000}{5,18,000} \times ₹77,70,000\right]$
Customer Support	18,56,000 $\left[\frac{80,000}{1,64,000} \times ₹38,04,800\right]$	11,13,600 $\left[\frac{48,000}{1,64,000} \times ₹38,04,800\right]$	8,35,200 $\left[\frac{36,000}{1,64,000} \times ₹38,04,800\right]$
Total Overheads Cost	81,48,080	55,96,150	69,75,770
Units	80,000	48,000	36,000
Overhead Cost *per unit*	101.85	116.59	193.77

(b) Contribution *per unit*

Particulars	(₹)
Selling Price	250
Variable Cost (₹90+₹70+₹30+₹4+₹6)	200
Contribution per unit	50

Savings/ (Loss) if the Plant is Shut Down

Particulars	(₹)
Savings in Fixed Cost (₹16,00,000 × 60%)	9,60,000
Loss of Contribution (₹50 × 10,000 units)	(5,00,000)
Additional Cost of Shut Down	(2,00,000)
Total	**2,60,000***

(#) ₹20L×25%+₹10L×80%+₹6L×50% = ₹16L

Considering the above analysis*, we can conclude that the decision of ***discontinuing plant will be beneficial for the company***.

Shut Down Point = $\frac{₹9,60,000 - ₹2,00,000}{₹50}$ = 15,200 units

Question 5

(a) The following table shows the different time estimates for a project:

Activity	Estimated Time (days)		
	Optimistic	Most Likely	Pessimist
1-2	4	6	14
1-3	2	4	12
1-5	3	5	13
2-4	5	9	19
3-5	5	8	11
5-6	3	5	7
4-6	5	6	7
5-7	5	7	9
6-7	2	4	6
6-8	6	9	12
7-9	2	4	6

You are required:

(i) Draw the project network.

(ii) Calculate the expected time and variance of each activity.

(iii) Find the expected length of critical path and its standard deviation.

(iv) Find the probability that project will be completed in 30 days.

(v) If due date of project is 36 days, find the probability of not meeting it.

(Area under normal distribution for Z = 0.65 is 0.2422 and for Z = 1.31 is 0.4049)

(10 Marks)

(b) PQR Limited has prepared a draft budget for the next year as follows:

Quantity	3,00,000 Units
	₹
Sales price per unit	400
Variable costs per unit:	
Direct Materials	100
Direct Labour	120
Variable overhead (2 hrs x ₹30)	60

Contribution per unit	*120*
Budgeted Contribution	*3,60,00,000*
Budgeted Fixed costs	*2,50,00,000*
Budgeted Profit	*1,10,00,000*

The Board of Directors is dissatisfied with this budget, and asks a working party to come up with an alternate budget with higher target figures.

The working party reports back with the following suggestions that will lead to a budgeted profit of ₹ 2,00,00,000. The company should spend ₹ 95,00,000 on advertising, & put the target sales price upto ₹ 420/- per unit. It is expected that sales volume will also rise, in spite of the price rise, to 4,00,000 units.

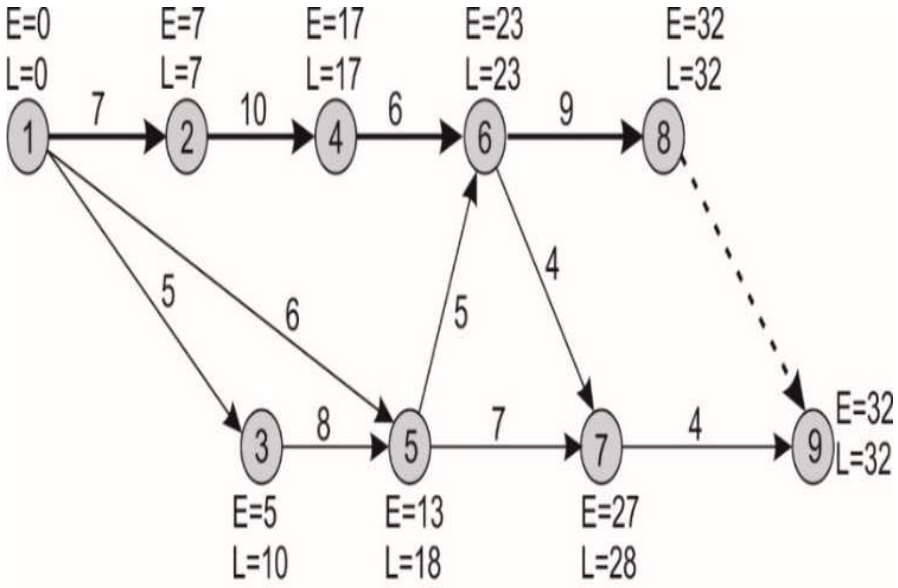
In order to achieve the extra production capacity, however, the work force must be able to reduce the time taken to make each unit of the product. It is proposed to offer a pay and productivity deal in which the wage rate per hour is increased to ₹ 75. The hourly rate for variable overhead will be unaffected.

Ascertain the target labour time required to achieve the target profit.

Prepare a revised budget giving effect to the above suggestions. ***(6 Marks)***

Answer

(a) (i)



(ii) The **Expected Time** and **Variance** for each of the activities (in days):

Activity	Time Estimates (Days)			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	6	14	7	$\frac{25}{9}$
1–3	2	4	12	5	$\frac{25}{9}$
1–5	3	5	13	6	$\frac{25}{9}$
2–4	5	9	19	10	$\frac{49}{9}$
3–5	5	8	11	8	1
5–6	3	5	7	5	$\frac{4}{9}$
4–6	5	6	7	6	$\frac{1}{9}$
5–7	5	7	9	7	$\frac{4}{9}$
6–7	2	4	6	4	$\frac{4}{9}$
6–8	6	9	12	9	1
7–9	2	4	6	4	$\frac{4}{9}$

(iii) Expected Project Length (T_e) = **32 Days**

Variance of the Critical Path 1–2–4–6–8–9 (σ_e^2) = $\frac{25}{9} + \frac{49}{9} + \frac{1}{9} + 1 + 0$

= $\frac{84}{9}$

Standard Deviation of the Critical Path (σ_e) = $\sqrt{\frac{84}{9}}$ = **3.055**

(iv) Probability that project will be completed in 30 Days:

Probability of Completing the Project by Schedule Time T_s is given by (Z)

$$= \frac{T_s - T_e}{\sigma_e}$$

Accordingly, Probability that project will be completed in 30 Days is given by (Z)

$$= \frac{30 - 32}{3.055}$$

$$= -0.65$$

Probability (Z = - 0.65) = 0.50 - 0.2422

= 0.2578 *Or* **25.78%**

(v) Probability of not meeting the due date of 36 Days:

Probability that project will be completed in 36 Days is given by (Z)

$$= \frac{36 - 32}{3.055}$$

$$= 1.31$$

Probability (Z = 1.31) = 0.50 + 0.4049

= 0.9049

Or = 90.49%

Probability of not meeting the due date of 36 Days = 1 – 0.9049

= 0.0951 *Or* **9.51%**

(b) **Statement Showing Target Labour Time**

Particulars	Amount (₹)
Target Sales (₹420× 4,00,000 units)	16,80,00,000
Less: Target Profit	2,00,00,000
Less: Proposed Advertising Expenses	95,00,000
Less: Budgeted Fixed Costs	2,50,00,000
Less: Direct Materials (₹100× 4,00,000 units)	4,00,00,000
Target Cost (Variable Overheads and Direct Labour) for 4,00,000 units …(A)	7,35,00,000
Direct Labour and Variable Overheads Rate per hour (₹75+₹30) …(B)	105
Target Time (Hours) for 4,00,000 units …(A)/ (B)	7,00,000
Target Labour Time for 1 unit (7,00,000 hrs. /4,00,000 units)	**1.75**

Revised Budget

4,00,000 units

Particulars	Amount (₹)
Sales Price *per unit*	420.00
Less: Variable Costs *per unit*	
Direct Materials	100.00
Direct Labour (₹75× **1.75 hrs.**)	131.25
Variable Overheads (₹30× **1.75 hrs.**)	52.50
Contribution *per unit*	136.25
Budgeted Contribution (₹136.25 × 4,00,000 units)	5,45,00,000
Less: Budgeted Fixed Costs	2,50,00,000
Less: Advertising Costs	95,00,000
Budgeted Profit	2,00,00,000

Question 6

(a) The budgeted and actual cost data of Excel Ltd. for the financial year 2017-18 is as under:

	Budget	***Actual***
Production unit	*8,000*	*7,000*
Material cost	*₹12,80,000 (800 kgs @ ₹1,600)*	*₹13,86,000 (840 kgs @ ₹1,650)*
Labour cost	*₹8,00,000 (@ ₹40 per hour)*	*₹7,99,920 (@ ₹44 per hour)*
Variable overhead	*₹1,50,000*	*₹1,38,000*
Fixed overhead	*₹2,30,000*	*₹2,90,000*

In the financial year 2018-19, production is budgeted for 15,000 units, material cost per kg. will increase from last year's actual by ₹150, but it is proposed to maintain the consumption efficiency of Financial Year (F. Y.) 2017-18 as budgeted. Labour efficiency will be lower by 1.5% and labour rate will be ₹44/- per hour. Variable and fixed overheads will go up by 16% over (F.Y.) 2017-18 actuals.

Prepare the Production cost budget for the financial year 2018-19 giving all the workings.

(For calculation of lower labour efficiency, difference in actual and standard time is also to be considered)

Show calculations upto two decimal points duly rounded off. ***(8 Marks)***

(b) Division X of KL Industries Limited is a profit centre and its entire production is utilized internally by other divisions.

The information regarding Division X is as follows:

Annual Production	***25, 000 units***
	₹
Material cost per unit	*115*
Labour cost per unit	*90*
Manufacturing Overhead per unit (40% fixed)	*35*
Administrative Overhead per unit (fixed)	*9*
Apportioned amount of Investment of Division X	*75,00,000*
Corporate tax rate	*30%*

You are required to determine the transfer price under each of the following strategies:

(i) 15% After tax Profit on transfer price

(ii) 20% Return on Investment (After Tax)

(iii) 15% After tax profit on list sale price, when actual sales (transfer) is made at a discount of 25% on list price.

(iv) 30% Mark up on marginal cost is added to total cost. ***(8 Marks)***

Answer

(a) Production Cost Budget

Elements of Cost	Working Notes	₹
Material	1/10 kg per unit of output as in budget 17-18; Price = ₹1,650 + ₹150, increase in actual 17-18 price by 150; 1/10 × 15,000 units × 1,800 ₹/kg	27,00,000
Labour	Budgeted (17-18) labour hrs./u = 2.5; Actual (17-18) = 7,99,920/(44 x7,000) = 2.5971; 1.5% × 2.5971 = 0.03896 18-19 labour hrs./u = 2.5971+0.03896 =2.63606 or 2.64 hrs./u 15,000 units × 44 ₹/hr × 2.64 hrs/u	17,42,400
Variable Overhead	1,38,000 / 7,000 × 15,000 × 1.16	3,43,029
Fixed Overhead	2,90,000 × 1.16	3,36,400
Total Cost for 18-19 for 15,000 units		51,21,829

☞

Labour efficiency can also be calculated through alternative approaches.

(b) (i) Total Cost = ₹115 + ₹90 + ₹35 + ₹9 = ₹249

Let 'T' be the Transfer Price

{Transfer Price − (Total Cost)} (1 − Tax Rate)	=	0.15T
{T − 249} (1− 0.30)	=	0.15T
{T − 249} (0.70)	=	0.15T
0.70T – 174.30	=	0.15T
0.70T – 0.15T	=	174.30
T	=	**₹316.91**

(ii) {Transfer Price − (Total Cost)} (1 − Tax Rate) = 20% of ROI

$$\{T - 249\}\ (1 - 0.30) = 0.20 \times \left(\frac{₹75,00,000}{25,000\ \text{units}}\right)$$

{T − 249} (0.70)	=	60
0.70T – 174.30	=	60
0.70T	=	234.30
T	=	**₹334.71**

(iii) {Transfer Price − (Total Cost)} (1 − Tax Rate) = 15% of List Sales Price

$$\{T - 249\}\ (1 - 0.30) = 0.15 \times \left(\frac{T}{0.75}\right)$$

{T − 249} (0.70)	=	0.20T
0.70T – 174.30	=	0.20T
0.70T – 0.20T	=	174.30
T	=	**₹348.60**

(iv) Transfer Price = Total Cost + 30% of Marginal Cost

= 249 + 0.30 × (115 + 90 + 35 × 0.60)

= **₹316.80**

☞

For determination of transfer price, *total cost has been considered* as division X is a Profit Centre and its entire production is utilized internally by other divisions.

Question 7

*Answer any **four** out of the following **five** questions:*

(a) Enumerate the usefulness of 'Pareto Analysis'.

(b) What are the main objectives of uniform costing? (State any four)

(c) Briefly explain two pricing practices in which non-cost reasons are important when setting prices.

(d) Mention four important factors to be considered in Marginal Costing Decisions.

(e) Will the solution for a minimization problem obtained by Vogel's Approximation Method (VAM) and Least Cost Method be same? Why? ***(4 × 4 = 16 Marks)***

Answer

(a) Pareto analysis is useful to:

- Prioritize problems, goals, and objectives Identify root causes.
- Select and define key quality improvement programs.
- Select key customer relations and service programs.
- Select key employee relations improvement programs.
- Select and define key performance improvement programs Maximize research and product development time.
- Verify operating procedures and manufacturing processes.
- Product or services sales and distribution.
- Allocate physical, financial, and human resources

(b) The main objectives of Uniform Costing are as follows:

- Facilitates Comparison: To facilitate the comparison of costs and performances of different units in the same industry; it provides objective basis.
- Eliminates Unhealthy Competition: To eliminate unhealthy competition among the different units of an industry.
- Improves Efficiency: To improve production capacity level and labour efficiency by comparing the production costs of different units with each other.

- Provides Relevant Data: To provide relevant cost information/data to the Government for fixing and regulating prices of the products.
- Ensures Standardisation: To bring standardisation and uniformity in the operation of participating units.
- Reduces Cost: To reduce production, administration, selling and distribution costs, and to exercise control on fixed costs.

(c) Two pricing practices in which non-cost reasons are important when setting price are:

- Price Discrimination: This is the practice of charging to some customers a higher price than that charged to other customers e.g. Airlines tickets for business travelers and LTC travelers are priced differently.
- Peak Load Pricing: This pricing system is based on capacity constraints. Under this pricing system a higher price for the same service or product is demanded when it approaches physical capacity limits e.g. telephones, tele-communication, hotel, car rental and electric utility industries are charged higher price at their peak load.

(d) In all recommendations of marginal costing decisions, the following factors are to be considered:

- Whether the product or production line in question makes a contribution.
- Where a choice is to be made between two courses of action, the additional fixed overhead, if any, should be taken into account.
- The continuity of demand after expansion or renovation or installation of the sophisticated machine and its impact on the selling price should also be considered. For example, if the selling price goes down when the supply increases the possible drop in profit should be taken into account.
- Cost is not the only criterion for decision making. Non-cost factors like the necessity to retain the experienced employees, etc. should also be considered.

(e) The initial solution need not be the same under both methods.

Vogel's Approximation Method (VAM) uses the differences between the minimum and the next minimum costs for each row and column. This is the penalty or opportunity cost of not utilizing the next best alternative. The highest penalty is given the 1st preference. This need not be the lowest cost.

For example, if a row has minimum cost as 2, and the next minimum as 3, penalty is 1; whereas if another row has minimum 4 and next minimum 6, penalty is 2, and this row is given preference. But Least Cost Method gives preference to the lowest cost cell, irrespective of the next cost.

Solution obtained using Vogel's Approximation Method is more optimal than Least Cost Method.

Initial solution will be same only when the maximum penalty and the minimum cost coincide.