INTER C.A. – COSTING

INDEX

COST ACCOUNTING SYSTEM

Q.1) The financial books of a company reveal the following data for the year ended 31st March, 2014:

	(Rs.)
Opening Stock:	
Finished goods 875 units	74,375
Work-in-process	32,000
01.04.2013 to 31.3.2014	
Raw materials consumed	7,80,000
Direct Labour	4,50,000
Factory overheads	3,00,000
Goodwill written off	1,00,000
Administration overheads	2,95,000
Dividend paid	85,000
Bad Debts	12,000
Selling and Distribution Overheads	61,000
Interest received	45,000
Rent received	18,000
Sales 14,500 units	20,80,000
Closing Stock: Finished goods 375 units	41,250
Work-in-process	38,667

The cost records provide as under:

→ Factory overheads are absorbed at 60% of direct wages.

→ Administration overheads are recovered at 20% of factory cost.

→ Selling and distribution overheads are charged at Rs. 4 per unit sold.

→ Opening Stock of finished goods is valued at Rs. 104 per unit.

→ The company values work-in-process at factory cost for both Financial and Cost Profit Reporting.

Required:

(i) Prepare statements for the year ended 31st March, 2014 show

→ the profit as per financial records

→ the profit as per costing records.

(ii) Present a statement reconciling the profit as per costing records with the profit as per Financial Records.

Solution:

(i) Statement of Profit as per financial records

OR

Profit & Loss Account of the company

(for the year ended March 31, 2014)

	(Rs.)		(Rs.)
To Opening stock:		By Sales	20,80,000
Finished Goods	74,375	By Closing stock:	
Work-in-process	32,000	Finished Goods	41250
To Raw materials consumed	7,80,000	Work-in-Process	38,667
To Direct labour	4,50,000	By Rent received	18,000
To Factory overheads	3,00,000	By Interest received	45,000
To Goodwill written off	1,00,000		
To Administration overheads	2,95,000		
To Selling & distribution overheads	61,000		
To Dividend paid	85,000		
To Bad debts	12,000		
To Profit	33,542		
	22,22,917		**22,22,917**

Statement of Profit as per costing records

(for the year ended March 31,2014)

	(Rs.)	(Rs.)
Sales revenue (14,500 units) (A)		20,80,000
Cost of Sales:		
Opening stock (875 units x Rs. 104)	91,000	
Add: Cost of production of 14,000 units (Refer to Working Note 1& 2)	17,92,000	
Less: Closing stock $\left(\frac{\text{Rs.17,92,000 x 375 units}}{\text{14,000 units}}\right)$	(48,000)	
Production cost of goods sold (14,500 units)	18,35,000	
Selling & distribution overheads (14,500 units x Rs. 4)	58,000	
Cost of sales: (B)	18,93,000	18,93,000
Profit: {(A) – (B)}		**1,87,000**

(ii) Statement of Reconciliation

(Reconciling the profit as per costing records with the profit as per financial records)

	(Rs.)	(Rs.)
Profit as per Cost Accounts		1,87,000
Add: Admin. overheads over absorbed (Rs. 2,98,667 – Rs. 2,95,000)	3,667	
Opening stock overvalued (Rs. 91,000 – Rs. 74,375)	16,625	
Interest received	45,000	
Rent received	18,000	83,292
		2,70,292
Less: Factory overheads under recovery (Rs. 2,98,667 – Rs. 2,95,000)	30,000	
Selling & distribution overheads under recovery (Rs. 61,000 – Rs. 58,000)	3,000	
Closing stock overvalued (Rs. 48,000 – Rs. 41,250)	6,750	
Goodwill written off	1,00,000	
Dividend	85,000	
Bad debts	12,000	2,36,750
Profit as per financial accounts		33,542

Working Notes:

1. Number of units produced

	Units
Sales	14,500
Add: Closing stock	375
Total	14,875
Less: Opening stock	875
Number of units produced	14,000

2. Cost Sheet

	(Rs.)
Raw materials consumed	7,80,000
Direct labour	4,50,000
Prime cost	12,30,000
Factory overheads (60% of direct wages)	2,70,000
Factory cost	15,00,000
Add: Opening work-in-process	32,000
Less: Closing work-in-process	38,667
Factory cost of goods produced	14,93,333
Administration overheads (20% of factory cost)	2,98,667
Cost of production of 14,000 units	17,92,000

Cost of production per unit: $\frac{\text{Total Cost of Production}}{\text{No.of units produced}} = \frac{\text{Rs.17,92,000}}{\text{14,000 units}} = Rs.128$

(Q.2) A manufacturing company disclosed a net loss of Rs. 3,47,000 as per their cost accounts for the year ended March 31,2014. The financial accounts however disclosed a net loss of Rs. 5,10,000 for the same period. The following information was revealed as a result of scrutiny of the figures of both the sets of accounts.

		(Rs.)
(i)	Factory Overheads under-absorbed	40,000
(ii)	Administration Overheads over-absorbed	60,000
(iii)	Depreciation charged in Financial Accounts	3,25,000
(iv)	Depreciation charged in Cost Accounts	2,75,000
(v)	Interest on investments not included in Cost Accounts	96,000
(vi)	Income-tax provided	54,000
(vii)	Interest on loan funds in Financial Accounts	2,45,000
(viii)	Transfer fees (credit in financial books)	24,000
(ix)	Stores adjustment (credit in financial books)	14,000
(x)	Dividend received	32,000

Prepare a memorandum Reconciliation Account

Solution:

Memorandum Reconciliation Accounts

Dr. **Cr.**

	(Rs.)		**(Rs.)**
To Net Loss as per Costing books	3,47,000	By Administration overheads over recovered in cost accounts	60,000
To Factory overheads under absorbed in Cost Accounts	40,000	By Interest on investment not included in Cost Accounts	96,000
To Depreciation under charged in Cost Accounts	50,000	By Transfer fees in Financial books	24,000
To Income-Tax not provided in Cost Accounts	54,000	By Stores adjustment (Credit in financial books)	14,000
To Interest on Loan Funds in Financial Accounts	2,45,000	By Dividend received in financial books	32,000
		By Net loss as per Financial books	5,10,000
	7,36,000		**7,36,000**

(Q.3) A manufacturing company has disclosed a net loss of Rs. 2,13,000 as per their cost accounting records for the year ended March 31, 2014. However, their financial accounting records disclosed a net loss of Rs. 2,58,000 for the same period. A scrutiny of data of both the sets of books of accounts revealed the following information:

		(Rs.)
(i)	Factory overheads under-absorbed	5,000
(ii)	Administration overheads over-absorbed	3,000
(iii)	Depreciation charged in financial accounts	70,000
(iv)	Depreciation charged in cost accounts	80,000
(v)	Interest on investments not included in cost accounts	20,000
(vi)	Income-tax provided in financial accounts	65,000
(vii)	Transfer fees (credit in financial accounts)	2,000
(viii)	Preliminary expenses written off	3,000
(ix)	Over-valuation of closing stock of finished goods in cost accounts	7,000

Prepare a Memorandum Reconciliation Account.

Solution:

Memorandum Reconciliation Account

Particulars	**(Rs.)**	**Particulars**	**(Rs.)**
To Net loss as per Costing books	2,13,000	By Administrative overhead over absorbed in costs	3,000
To Factory overheads under absorbed	5,000	By Depreciation over charged in Cost books (Rs.80,000 – Rs.70,000)	10,000
To Income tax not provided in Cost books	65,000	By Interest on investments not included in Cost books	20,000
To Preliminary expenses written off in Financial books	3,000	By Transfer fees not considered in Cost books	2,000
To Over-valuation of Closing Stock of finished goods in Cost books	7,000	By Net loss as per Financial books	2,58,000
	2,93,000		**2,93,000**

(Q.4) BPR Limited keeps books on integrated accounting system. The following balances appear in the books as on April 1, 2013.

	Dr. (Rs.)	Cr. (Rs.)
Stores Control A/c	40,950	–
Work-in-progress A/c	38,675	–
Finished Goods A/c	52,325	–
Bank A/c	–	22,750
Trade Payables A/c	–	18,200
Non-Current Assets A/c	1,47,875	–
Trade Receivables A/c	27,300	–
Share Capital A/c	–	1,82,000
Provision for Depreciation A/c	–	11,375
Provision for Doubtful Debts A/c	–	3,725
Factory Overheads Outstanding A/c	–	6,250
Pre-Paid Administration Overheads A/c	9,975	–
Profit & Loss A/c*	–	72,800
(*Reserve & Surplus)	3,17,100	3,17,100

The transactions for the year ended March 31, 2014, were as given below:

	(Rs.)	(Rs.)
Direct Wages	1,97,925	–
Indirect Wages	11,375	2,09,300
Purchase of materials (on credit)		2,27,500
Materials issued to production		2,50,250
Material issued for repairs		4,550
Goods finished during the year (at cost)		4,89,125
Credit Sales		6,82,500
Cost of Goods sold		5,00,500
Production overheads absorbed		1,09,200
Production overheads paid during the year		91,000
Production overheads outstanding at the end of year		7,775
Administration overheads paid during the year		27,300
Selling overheads incurred		31,850
Payment to Trade Payables		2,29,775
Payment received from Trade Receivables		6,59,750
Depreciation of Machinery		14,789
Administration overheads outstanding at the end of year		2,225
Provision for doubtful debts at the end of the year		4,590

Required:

Write up accounts in the integrated ledger of BPR Limited and prepare a Trial balance.

Solution

Stores Control A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Balance b/d	40,950	By WIP A/c	2,50,250
To Trade Payables A/c	2,27,500	By Production overheads A/c	4,550
		By Balance c/d	13,650
	2,68,450		**2,68,450**

Wages Control A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Bank (Direct wages)	1,97,925	By Work-in-Progress A/c	1,97,925
To Bank (Indirect wages)	11,375	By Production overheads A/c	11,375
	2,09,300		**2,09,300**

Work-in-Progress A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Balance b/d	38,675	By Finish goods A/c	4,89,125
To Wages control A/c	1,97,925	By Balance c/d	1,06,925
To Stores control A/c	2,50,250		
To Production overheads A/c	1,09,200		
	5,96,050		**5,96,050**

Production Overheads A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Wages control A/c	11,375	By WIP A/c	1,09,200
To Stores control A/c	4,550	By Profit & Loss A/c	14,039
To Bank (Rs. 91,000 – Rs. 6,250)	84,750	(Under-absorbed overheads Written off)	
To Production overheads outstanding	7,775		
To Provision for depreciation	14,789		
	1,23,239		**1,23,239**

Production overhead incurred = Payment made + Closing Outstanding + Prov. for Depreciation – Opening Outstanding

Finished Goods A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Balance b/d	52,325	By Cost of sales A/c	5,00,500
To Work-in-progress A/c	4,89,125	By Balance c/d	80,450
To Admin. overheads A/c	39,500		
	5,80,950		**5,80,950**

Administration Overheads A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Pre-paid admin. overheads A/c	9,975	By Finished goods A/c	39,500
To Bank	27,300		
To Admin. overheads outstanding	2,225		
	39,500		**39,500**

Cost of Sales A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Finished goods A/c	5,00,500	By Sales A/c	5,32,350
To Selling overheads	31,850		
	5,32,350		**5,32,350**

Sales A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Cost of sales A/c	5,32,350	By Trade Receivables A/c	6,82,500
To Profit & Loss A/c	1,50,150		
	6,82,500		**6,82,500**

Factory Overheads / Production Overheads Outstanding A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Bank	6,250	By Balance b/d	6,250
To Balance c/d	7,775	By Production overheads	7,775
	14,025		**14,025**

Prepaid Administration Overheads A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Balance b/d	9,975	By Admin. overheads A/c	9,975
	9,975		**9,975**

Provision for Depreciation A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Balance c/d	26,164	By Balance b/d	11,375
		By Production overheads A/c	14,789
	26,164		**26,164**

Provision for Doubtful Debts A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Balance c/d	4,590	By Balance b/d	3,725
		By Profit & Loss A/c	865
	4,590		**4,590**

Profit & Loss A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Provision for doubtful debts	865	By Balance b/d	72,800
To Production overheads	14,039	By Sales A/c	1,50,150
To Balance c/d*	2,08,046		
	2,22,950		**2,22,950**

* Profit is transferred to Reserve & Surplus.

Trade Receivables A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Balance b/d	27,300	By Bank A/c	6,59,750
To Sales A/c	6,82,500	By Balance c/d	50,050
	7,09,800		**7,09,800**

Trade Payables A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Bank	2,29,775	By Balance b/d	18,200
To Balance c/d	15,925	By Stores control/Ac	2,27,500
	2,45,700		**2,45,700**

Non Current Assets A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Balance b/d	1,47,875	By balance c/d	1,47,875

Bank A/c

Dr. **Cr.**

	(Rs.)		(Rs.)
To Trade Receivables	6,59,750	By Balance b/d	22,750
		By Direct wages	1,97,925
		By Indirect wages	11,375
		By Production overheads (Rs. 84,750 + Rs.6,250)	91,000
		By Admn. Overheads A/c	27,300
		By Selling overheads A/c	31,850
		By Trade Payables A/c	2,29,775
		By Balance c/d	47,775
	6,59,750		**6,59,750**

Trial Balance

As on March 31, 2014

Dr. **Cr.**

	(Rs.)	(Rs.)
Stores control A/c	13,650	
Work in Progress A/c	1,06,925	
Finished goods A/c	80,450	
Bank A/c	47,775	
Trade Payables A/c		15,925
Non- current Assets A/c	1,47,875	
Trade Receivables A/c	50,050	
Share capital A/c		1,82,000
Provision for depreciation A/c		26,164
Reserve & Surplus (Profit & Loss A/c)		2,08,046
Production overheads outstanding A/c		7,775
Outstanding administrative overheads A/c		2,225
Provision for doubtful debt		4,590
	4,46,725	**4,46,725**

(Q.5)

The following is the Trading and Profit & Loss Account of Omega Limited:

Dr. **Cr.**

Particulars	(Rs.)	Particulars		(Rs.)
To Materials consumed	23,01,000	By Sales (30,000 units)		48,75,000
To Direct wages	12,05,750	By Finished goods Stock (1,000 units)		1,30,000
To Production Overheads	6,92,250	By Work-in-progress:		
To Administration Overheads	3,10,375	Materials	55,250	
To Selling and Distribution Overheads	3,68,875	Wages	26,000	
To Preliminary Expenses written off	22,750	Production Overheads	16,250	97,500
To Goodwill written off	45,500			
To Fines	3,250	By Dividends received		3,90,000
To Interest on Mortgage	13,000	By Interest on bank deposits		65,000
To Loss on Sale of machine	16,250			
To Taxation	1,95,000			
To Net Profit for the year	3,83,500			
	55,57,500			**55,57,500**

Omega Limited manufactures a standard unit.

The Cost Accounting records of Omega Ltd. show the following:

(i) Production overheads have been charged to work-in-progress at 20% on Prime cost.

(ii) Administration Overheads have been recovered at Rs. 9.75 per finished Unit.

(iii) Selling & distribution Overheads have been recovered at Rs. 13 per Unit sold.

(iv) The Under- or Over-absorption of Overheads has not been transferred to costing P/L A/c.

Required:

(i) Prepare a proforma Costing Profit & Loss account, indicating net profit.

(ii) Prepare Control accounts for Production overheads, Administration Overheads and Selling & Distribution Overheads.

(iii) Prepare a statement reconciling the profit disclosed by the Cost records with that shown in Financial accounts.

Solution:

(i) Costing Profit & Loss A/c

	(Rs.)
Materials	23,01,000
Wages	12,05,750
Prime Cost	35,06,750
Production overheads (20% of Prime Cost)	7,01,350
	42,08,100
Less: Work in Progress	97,500
Manufacturing cost incurred during the period	41,10,600
Add: Administration Overheads (Rs.9.75 x 31,000 units)	3,02,250
Cost of Production	44,12,850
Less : Closing Finished goods stock $\left(Rs.44,12,850 \times \frac{1,000}{31,000} \right)$	1,42,350
Cost of Goods Sold	42,70,500
Add Selling & Distribution Overheads (Rs.13 × 30,000 units)	3,90,000
Cost of Sales	46,60,500
Profit (Balancing figure)	2,14,500
Sales	48,75,000

(ii) Production OH A/c

	(Rs.)		(Rs.)
To Gen ledger Adj. A/c	6,92,250	By WIP A/c	7,01,350
To Overhead adj. A/c (Over-absorption)	9,100		
	7,01,350		**7,01,350**

Administration Overheads A/c

	(Rs.)		(Rs.)
To Gen Ledger Adj. A/c	3,10,375	By Finished goods A/c	3,02,250
		By Overhead adj. A/c (Under-absorption)	8,125
	3,10,375		**3,10,375**

Selling & Distribution Overheads A/c

	(Rs.)		(Rs.)
To Gen. Ledger Adj A/c	3,68,875	By Cost of Sales A/c	3,90,000
To Overhead Adj. A/c (Over-absorption)	21,125		
	3,90,000		**3,90,000**

(iii) Reconciliation Statement

	(Rs.)	(Rs.)
Profits as per cost accounts		2,14,500
Add: Production Overheads- over absorbed	9,100	
Selling & Distribution Overheads- over absorbed	21,125	
Dividend received	3,90,000	
Interest on bank deposits	65,000	4,85,225
		6,99,725
Less: Administration Overheads- under-absorbed	8,125	
Preliminary exp. Written off	22,750	
Goodwill written off	45,500	
Fines	3,250	
Interest on Mortgage	13,000	
Loss on sale of machinery	16,250	
Taxation	1,95,000	
Write-down of Finished stock (Rs.1,42,350 – Rs.1,30,000)	12,350	(3,16,225)
Profit as per Financial Accounts		3,83,500

PROCESS COSTING

Q.1) Following information is available regarding process A for the month of February, 2014:

Production Record:

Units in process as on 01.02.2014	4,000
(All materials used, 25% complete for labour and overhead)	
New units introduced	16,000
Units completed	14,000
Units in process as on 28.02.2014	6,000
(All materials used, 33-1/3% complete for labour and overhead)	
Cost Records:	
Work-in-process as on 01.02.2014	(Rs.)
Materials	6,000
Labour	1,000
Overhead	1,000
	8,000
Cost during the month	
Materials	25,600
Labour	15,000
Overhead	15,000
	55,600

Presuming that average method of inventory is used, prepare:

(i) Statement of Equivalent Production.

(ii) Statement showing Cost for each element.

(iii) Statement of Apportionment of cost.

(iv) Process Cost Account for Process A.

Solution:

(i) Statement of Equivalent Production (Average cost method)

Input (Units)	Particulars	Output Units	Equivalent Production					
			Materials		Labour		Overheads	
			(%*)	Units**	(%)*	Units**	(%)*	Units**
20,000	Completed	14,000	100	14,000	100	14,000	100	14,000
	WIP	6,000	100	6,000	33-1/3	2,000	33-1/3	2,000
20,000		**20,000**		**20,000**		**16,000**		**16,000**

*Percentage of completion ** Equivalent units

(ii) Statement showing Cost for each element

Particulars	Materials	Labour	Overhead	Total
Cost of opening work-in-progress (Rs.)	6,000	1,000	1,000	8,000
Cost incurred during the month (Rs.)	25,600	15,000	15,000	55,600
Total cost (Rs.) : (A)	31,600	16,000	16,000	63,600
Equivalent units : (B)	20,000	16,000	16,000	
Cost per equivalent unit (Rs.) : C= (A ÷ B)	1.58	1	1	3.58

(iii) Statement of Apportionment of cost

	(Rs.)	(Rs.)
Value of output transferred: (A) (14,000 units × Rs. 3.58)		50,120
Value of closing work-in-progress: (B)		
Material (6,000 units × Rs.1.58)	9,480	
Labour (2,000 units × Rs. 1)	2,000	
Overhead (2,000 units × Rs. 1)	2,000	13,480
Total cost : (A + B)		63,600

(iv) Process- A Account

Particulars	Units	(Rs.)	Particulars	Units	(Rs.)
To Opening WIP	4,000	8,000	By Completed units	14,000	50,120
To Materials	16,000	25,600	By Closing WIP	6,000	13,480
To Labour	15,000				
To Overhead	15,000				
	20,000	**63,600**		**20,000**	**63,600**

Q.2)

Following details are related to the work done in Process 'A' of XYZ Company during the month of March, 2014:

	(Rs.)
Opening work-in-progress (2,000 units):	
Materials	80,000
Labour	15,000
Overheads	45,000
Materials introduced in Process Rs.A' (38,000 units)	14,80,000
Direct labour	3,59,000
Overheads	10,77,000
Units scrapped: 3,000 units,	
Degree of completion:	

Materials	100%
Labour and overheads	80%
Closing work-in-progress : 2,000 units,	
Degree of Completion:	
Materials	100%
Labour and overheads	80%
Units finished and transferred to Process 'B' : 35,000 units	
Normal Loss:	
5% of total input including opening work-in-progress	
Scrapped units fetch Rs. 20 per piece.	

You are required to prepare:

(i) Statement of equivalent production;

(ii) Statement of cost;

(iii) Statement of distribution cost; and

(iv) Process 'A' Account, Normal and Abnormal Loss Accounts.

Solution:

(i) Statement of Equivalent Production

Input	Units	Output	Units	Equivalent production			
				Material		Labour & Overheads	
				(%)	Units	(%)	Units
Opening WIP	2,000	Completed and transferred to Process 'B'	35,000	100	35,000	100	35,000
Units introduced	38,000	Normal loss (5% of 40,000 units)	2,000	—	—	—	—
		Abnormal loss	1,000	100	1,000	80	800
		Closing WIP	2,000	100	2,000	80	1,600
	40,000		40,000		38,000		37,400

(ii) Statement of Cost

Details	Cost at the beginning of process (Rs.)	Cost added (Rs.)	Total cost (Rs.)	Equivalent Units (Rs.)	Cost per unit (Rs.)
Material	80,000	14,80,000	15,60,000		
Less: Value of normal loss (2,000 units × Rs. 20)			(40,000)		
			15,20,000	38,000	40
Labour	15,000	3,59,000	3,74,000	37,400	10
Overheads	45,000	10,77,000	11,22,000	37,400	30
Total	**1,40,000**	**29,16,000**	**30,16,000**		**80**

(iii) Statement of Distribution of Cost

	(Rs.)
Completed and transferred to Process-B (35,000 units × Rs. 80)	28,00,000
Abnormal Loss:	
Materials (1,000 units × Rs. 40)	40,000
Wages (800 units × Rs. 10)	8,000
Overheads (800 units × Rs. 30)	24,000
	72,000
Closing WIP:	
Materials (2,000 units × Rs. 40)	80,000
Wages (1,600 units × Rs. 10)	16,000
Overheads (1,600 units × Rs. 30)	48,000
	1,44,000

(iv) Process 'A' Account

Dr. **Cr.**

Particulars	**Units**	**Amount**	**Particulars**	**Units**	**Amount**
To Opening WIP	2,000	1,40,000*	By Normal Loss	2,000	40,000
To Material introduced	38,000	14,80,000	By Abnormal loss	1,000	72,000
To Direct labour		3,59,000	By Process 'B' A/c transfer to next process	35,000	28,00,000
To Overheads		10,77,000	By Closing WIP	2,000	1,44,000
	40,000	**30,56,000**		**40,000**	**30,56,000**

*Materials + Labour + Overheads = Rs. (80,000 + 15,000 + 45,000) = Rs. 1,40,000.

Normal Loss Account

Particulars	**Units**	**Amount**	**Particulars**	**Units**	**Amount**
To Process-A A/c	2,000	40,000	By Cost Ledger Control A/c	2,000	40,000
	2,000	**40,000**		**2,000**	**40,000**

Abnormal Loss Account

Particulars	**Units**	**Amount**	**Particulars**	**Units**	**Amount**
To Process-A A/c	1,000	72,000	By Cost Ledger Control A/c.	1,000	20,000
			By Costing Profit & Loss A/c.		52,000
	1,000	**72,000**		**1,000**	**72,000**

(Q.3) A product passes through three processes 'X', 'Y' and 'Z'. The output of process 'X' and 'Y' is transferred to next process at cost plus 20 per cent each on transfer price and the output of process 'Z' is transferred to finished stock at a profit of 25 per cent on transfer price. The following information are available in respect of the year ending 31st March, 2014:

	Process-X	Process-Y	Process-Z	Finished Stock
	(Rs.)	(Rs.)	(Rs.)	(Rs.)
Opening stock	15,000	27,000	40,000	45,000
Material	80,000	65,000	50,000	—
Wages	1,25,000	1,08,000	92,000	—
Manufacturing Overheads	96,000	72,000	66,500	—
Closing stock	20,000	32,000	39,000	50,000
Inter process profit included in Opening stock	NIL	4,000	10,000	20,000

Stock in processes is valued at prime cost. The finished stock is valued at the price at which it is received from process 'Z'. Sales of the finished stock during the period was Rs. 14,00,000.

You are required to prepare:

(i) Process accounts and finished stock account showing profit element at each stage.

(ii) Costing Profit and Loss account.

(iii) Show the relevant items in the Balance Sheet.

Solution:

(i) Process 'X' Account

Dr. **Cr.**

Particulars	Cost (Rs.)	Profit (Rs.)	Total (Rs.)	Particulars	Cost (Rs.)	Profit (Rs.)	Total (Rs.)
To Opening Stock	15,000	-	15,000	By Process 'Y' A/c (Transfer)	2,96,000	74,000	3,70,000
To Material	80,000	-	80,000				
To Wages	1,25,000	-	1,25,000				
Total	2,20,000	-	2,20,000				
Less: Closing stock	20,000	-	20,000				
Prime Cost	2,00,000		2,00,000				
To Manufacturing Overheads	96,000	-	96,000				
Total cost	2,96,000	-	2,96,000				
To Costing Profit and Loss A/c (20% on transfer Price or 25% on cost)		74,000	74,000				
	2,96,000	**74,000**	**3,70,000**		**2,96,000**	**74,000**	**3,70,000**

Process 'Y' Account

Dr. **Cr.**

Particulars	Cost (Rs.)	Profit (Rs.)	Total (Rs.)	Particulars	Cost (Rs.)	Profit (Rs.)	Total (Rs.)
To Opening Stock	23,000	4,000	27,000	By Process 'Z' A/c (Transfer)	5,36,379 2,26,121	7,62,500	
To Process 'X' A/c	2,96,000	74,000	3,70,000				
To Material	65,000	—	65,000				
To Wages	1,08,000	—	1,08,000				
Total	4,92,000	78,000	5,70,000				
Less: Closing stock	27,621	4,379	32,000				
Prime Cost	4,64,379	73,621	5,38,000				
To Manufacturing Overheads	72,000	—	72,000				
Total cost	5,36,379	73,621	6,10,000				
To Costing Profit and Loss A/c (20% on transfer Price or 25% on cost)	—	1,52,500	1,52,500				
	5,36,379	**2,26,121**	**7,62,500**		**5,36,379**	**2,26,121**	**7,62,500**

Process 'Z' Account

Dr. **Cr.**

Particulars	Cost (Rs.)	Profit (Rs.)	Total (Rs.)	Particulars	Cost (Rs.)	Profit (Rs.)	Total (Rs.)
To Opening Stock	30,000	10,000	40,000	By Finished Stock A/c (Transfer)	7,45,629	5,50,371	12,96,000
To Process 'Y' A/c	5,36,379	2,26,121	7,62,500				
To Material	50,000	—	50,000				
To Wages	92,000	—	92,000				
Total	7,08,379	2,36,121	9,44,500				
Less: Closing stock	29,250	9,750	39,000				
Prime Cost	6,79,129	2,26,371	9,05,500				
To Manufacturing Overheads	66,500	—	66,500				
Total cost	7,45,629	2,26,371	9,72,000				
To Costing Profit and Loss A/c (25% on transfer Price or 33 1/3% on cost)	—	3,24,000	3,24,000				
	7,45,629	**5,50,371**	**12,96,000**		**7,45,629**	**5,50,371**	**12,96,000**

Finished Stock Account

Dr. **Cr.**

Particulars	Cost (Rs.)	Profit (Rs.)	Total (Rs.)	Particulars	Cost (Rs.)	Profit (Rs.)	Total (Rs.)
To Opening Stock	25,000	20,000	45,000	By Costing P&L A/c A/c (Transfer)	7,41,862	6,58,138	14,00,000
To Process 'Z' A/c	7,45,629	5,50,371	12,96,000				
Total	7,70,629	5,70,371	13,41,000				
Less: Closing stock	28,767	21,233	50,000				
To Costing Profit and Loss A/c	7,41,862	5,49,138	12,91,000				
		1,09,000	1,09,000				
	7,41,862	**6,58,138**	**14,00,000**		**7,41,862**	**6,58,138**	**14,00,000**

Costing Profit & Loss Account

for the year ending 31st March, 2014

Dr. **Cr.**

Particulars	Amount (Rs.)	Particulars	Amount (Rs.)
To Provision for unrealized profit on closing stock (Rs. 4,379 + Rs. 9,750 + Rs. 21,233)	35,362	By Provision for unrealized profit on opening stock (Rs. 4,000 + Rs. 10,000 + Rs. 20,000)	34,000
To Net Profit	6,58,138	By Process X A/c	74,000
		By Process Y A/c	1,52,500
		By Process Z A/c	3,24,000
		By Finished Stock A/c	1,09,000
	6,93,500		**6,93,500**

Workings:

Calculation of amount of unrealized profit on closing stock:

Process 'X' = Nil

Process 'Y' = $\frac{\text{Rs.}78,000}{Rs.5,70,000}$ x Rs.32,000 =Rs.4,379

Process 'Z' = $\frac{\text{Rs.}2,36,121}{Rs.9,44,500}$ x Rs.39,000 = Rs.9,750

Finished Stock = $\frac{\text{Rs.}5,50,371}{Rs.12,96,000}$ x Rs.50,000 = Rs.21,233 .

Balance Sheet as on 31st March, 2014 (Extract)

Liabilities	Amount (Rs.)	Assets	Amount (Rs.)
Net profit	6,58,138	Closing stock:	
		Process – X	20,000
		Process – Y	32,000
		Process – Z	39,000
		Finished stock	50,000
			1,41,000
		Less: Provision for unrealized profit	35,362
			1,05,638

(Q.4) A product passes through two processes A and B. During the year 2011, the input to process A of basic raw material was 8,000 units @ Rs. 9 per unit. Other information for the year is a s follows:

	Process A	Process B
Output units	7,500	4,800
Normal loss (% to input)	5%	10%
Scrap value per unit (Rs.)	2	10
Direct wages (Rs.)	12,000	24,000
Direct expenses (Rs.)	6,000	5,000
Selling price per unit (Rs.)	15	25

Total overheads Rs.17,400 were recovered as percentage of direct wages. Selling expenses were Rs.5,000. There are not allocate to the processes. 2/3 of the output of Process A was passed on to the next process and the balance was sold. The entire output of Process B was sold.

Prepare Process A an B Accounts.

Solution :

Process- A Account

Particulars	Units	Amount (Rs.)	Particulars	Units	Amount (Rs.)
To Input	8,000	72,000	By Normal Loss (5% of 8,000 units × Rs. 2)	400 800	
To Direct Wages	—	12,000	By Abnormal loss (100 units × Rs. 12.50)	100	1,250
To Direct Exp.	—	6,000	By Process- B A/c (7,500 units× $\frac{2}{3}$ × Rs.12.50)	5,000 62,500	
To Overheads (Rs.17,400 × $\frac{1}{3}$)	—	5,800	By Profit and Loss A/c (7,500 units× $\frac{1}{3}$ × Rs.12.50)	2,500	31,250
	8,000	**95,800**		**8,000**	**95,800**

$$\text{Cost per unit} = \frac{\text{Rs.95,800 -- Rs.800}}{\text{8,000 units - 400 units}} = \frac{\text{Rs.95,000}}{\text{7,600 units}} = Rs.12.50$$

Process- B Account

Particulars	Units	Amount (Rs.)	Particulars	Units	Amount (Rs.)
To Process- A A/c	5,000	62,500	By Normal Loss (10% of 5,000 units × Rs.10)	500	5,000
To Direct Wages	—	24,000	By Finished Stock A/c or Profit & loss A/c (4,800 units × Rs. 21.80)	4,800	1,04,640
To Direct Expenses	—	5,000			
To Overheads (Rs.17,400 × $\frac{2}{3}$)	—	11,600			
To Abnormal gain	300	6,540			
	5,300	**1,09,640**		**5,300**	**1,09,640**

$$\text{Cost per unit} = \frac{\text{Rs.1,03,100 - Rs.5,000}}{\text{5,000 units - 500 units}} = \frac{\text{Rs.98,100}}{\text{4,500 units}} = Rs.21.80$$

Working

Profit & Loss A/c

Particulars	Amount (Rs.)	Amount (Rs.)	Particulars	Amount (Rs.)	Amount (Rs.)
To Cost of Sales:			By Sales:		
Process A (2,500 units × Rs. 12.50)	31,250		Process A (2,500 units × Rs.15)	37,500	
Process B (4,800 units × Rs. 21.80)	1,04,640	1,35,890	Process B (4,800 units × Rs. 25)	1,20,000	1,57,500
To Abnormal Loss:			By Abnormal gain:		
Process A [(100 units × Rs.(12.50-2)]		1,050	Process B [(300 units × Rs. (21.80-10)]		3,540
To Selling expenses		5,000			
To Net Profit		19,100			
		1,61,040			**1,61,040**

Note:

1. As mentioned selling expenses are not allocable to process which is debited directly to the P/L A/c.
2. It is assumed that Process A and Process B are not responsibility centres and hence, Process A and Process B have not been credited to direct sales. P/L A/c is prepared to arriving at profit/loss.

JOINT PRODUCT BY PRODUCT

Q.1) The Sunshine Oil Company purchases crude vegetables oil. It does refining of the same. The refining process results in four products at the split off point: M, N, O and P.

Product O is fully processed at the split off point. Product M, N and P can be individually further refined into 'Super M', 'Super N' and 'Super P'. In the most recent month (March, 2014), the output at split off point was:

Product M 3,00,000 gallons

Product N 1,00,000 gallons

Product O 50,000 gallons

Product P 50,000 gallons

The joint cost of purchasing the crude vegetables oil and processing it were Rs.40,00,000.

Sunshine had no beginning or ending inventories. Sales of Product O in March, 2014 were Rs. 20,00,000. Total output of products M, N and P was further refined and then sold. Data related to March, 2014 are as follows:

	Further Processing Costs to Make Super Products	**Sales**
Super M'	Rs. 80,00,000	Rs. 1,20,00,000
Super N'	Rs. 32,00,000	Rs. 40,00,000
Super P'	Rs. 36,00,000	Rs. 48,00,000

Sunshine had the option of selling products M, N and P at the split off point. This alternative would have yielded the following sales for the March, 2014 production:

Product M Rs. 20,00,000

Product N Rs. 12,00,000

Product P Rs. 28,00,000

You are required to answer:

(i) How the joint cost of Rs. 40,00,000 would be allocated between each product under each of the following methods (a) sales value at split off; (b) physical output (gallons); and (c) estimated net realizable value?

(ii) Could Sunshine have increased its March, 2014 operating profits by making different decisions about the further refining of product M, N or P? Show the effect of any change you recommend on operating profits.

Solution:

(i) Allocation of Joint Cost by the following methods:

(a) Sales Value at split – off Method

Products	Sales value of the point of split off (Rs.)	Joint cost allocated (Rs.)
M	20,00,000	$\left(\frac{\text{Rs.}20,00,000}{\text{Rs.}80,00,000}\right)$ x Rs.40,00,000 = 10,00,000
N	12,00,000	$\left(\frac{\text{Rs.}12,00,000}{\text{Rs.}80,00,000}\right)$ x Rs.40,00,000 = 6,00,000
O	20,00,000	$\left(\frac{\text{Rs.}20,00,000}{\text{Rs.}80,00,000}\right)$ x Rs.40,00,000 = 10,00,000
P	28,00,000	$\left(\frac{\text{Rs.}28,00,000}{\text{Rs.}80,00,000}\right)$ x Rs.40,00,000 = 14,00,000
Total	80,00,000	40,00,000

(b) Physical output (gallon) Method

Products	Physical output (in gallon)	Joint cost allocated (Rs.)
M	3,00,000	$\left(\frac{3,00,000 \text{ gallon}}{5,00,000 \text{ gallon}}\right)$ x Rs.40,00,000 = 24,00,000
N	1,00,000	$\left(\frac{1,00,000 \text{ gallon}}{5,00,000 \text{ gallon}}\right)$ x Rs.40,00,000 = 8,00,000
O	50,000	$\left(\frac{50,000 \text{ gallon}}{5,00,000 \text{ gallon}}\right)$ x Rs.40,00,000 = 4,00,000
P	50,000	$\left(\frac{50,000 \text{ gallon}}{5,00,000 \text{ gallon}}\right)$ x Rs.40,00,000 = 4,00,000
Total	5,00,000	40,00,000

(c) Estimated Net Realizable Value Method

Products	Sales revenue after further processing (Rs.)	Sales revenue at the point of split off (Rs.)	Further processing costs (Rs.)	Net realizable value (Rs.)	Joint cost allocated (Rs.)
(a)	(b)	(c)	(d)	(e)=[(b) – (d)] or (c)	
'Super M'	1,20,00,000	—	80,00,000	40,00,000	20,00,000 $\left(\frac{Rs.40,00,000}{Rs.80,00,000}\right)$ x Rs.40,00,000
'Super N'	40,00,000	—	32,00,000	8,00,000	4,00,000 $\left(\frac{Rs.8,00,000}{Rs.80,00,000}\right)$ x Rs.40,00,000
'O'	—	20,00,000	—	20,00,000	10,00,000 $\left(\frac{Rs.20,00,000}{Rs.80,00,000}\right)$ x Rs.40,00,000
'Super 'P'	48,00,000	—	36,00,000	12,00,000	6,00,000 $\left(\frac{Rs.12,00,000}{Rs.80,00,000}\right)$ x Rs.40,00,000
		Total	**1,48,00,000**	**80,00,000**	**40,00,000**

(ii) Decision about the further refining of Product M, N or P.

Products	M (Rs.)	N (Rs.)	P (Rs.)
Sales revenue after further processing: (A)	1,20,00,000	40,00,000	48,00,000
Sales revenue at the point of split off: (B)	20,00,000	12,00,000	28,00,000
Incremental sales revenue: (C)={(A)-(B)}	1,00,00,000	28,00,000	20,00,000
Further processing cost: (D)	80,00,000	32,00,000	36,00,000
Profit (Loss) arising due to further processing: {(C) – (D)}	20,00,000	(4,00,000)	(16,00,000)

It is apparent from above that further processing of products N and P results in the decrease of the operating profit by Rs. 20,00,000. Hence M/s. Sunshine Oil Company should not resort to further processing of its N and P products. This decision on adoption would increase the operating profits of the company for the month of March, 2014 by Rs. 20,00,000.

(Q.2) Three joint products are produced by passing chemicals through two consecutive processes. Output from process 1 is transferred to process 2 from which the three joint products are produced and immediately sold. The data regarding the processes for April, 2014 is given below:

	Process 1	Process 2
Direct material 2,500 kg. @ Rs. 4 per kg.	Rs. 10,000	–
Direct labour	Rs. 6,250	Rs. 6,900
Overheads	Rs. 4,500	Rs. 6,900
Normal Loss	10% of input	–
Scrap value of loss	Rs. 2 per kg.	–
Output	2,300 kg.	Joint products
		A – 900 kg.
		B – 800 kg.
		C – 600 kg.

There were no opening or closing stocks in either process and the selling prices of the output from process 2 were:

Joint product A Rs. 24 per kg.

Joint product B Rs. 18 per kg.

Joint product C Rs. 12 per kg.

Required:

(a) Prepare an account for process 1 together with any Loss or Gain Accounts you consider necessary to record the month's activities.

(b) Calculate the profit attributable to each of the joint products by apportioning the total costs from process 2

(i) According to weight of output;

(ii) By the market value of production.

Solution

(a) Process- 1 Account

	Qty. (kg.)	Rate per kg. (Rs.)	Amount (Rs.)		Qty. (kg.)	Rate per kg. (Rs.)	Amount (Rs.)
To Direct material	2,500	4	10,000	By Process 2 (Working Note 1)	2,300	9*	20,700
To Direct labour	-	-	6,250	By Normal Loss (10% of input)	250	2	500
To Overhead	-	-	4,500				
To Abnormal gain	50	9*	450				
	2,550		**21,200**		**2,550**		**21,200**

Normal Loss Account

	Qty. (kg.)	Rate per kg. (Rs.)	Amount (Rs.)		Qty. (kg.)	Rate per kg. (Rs.)	Amount (Rs.)
To Process- 1	250	2	500	By Sales	200	2	400
				By Abnormal gain	50	2	100
	250		**500**		**250**		**500**

Abnormal Gain Account

	Qty. (kg.)	Rate per kg. (Rs.)	Amount (Rs.)		Qty. (kg.)	Rate per kg. (Rs.)	Amount (Rs.)
To Normal Loss A/c	50	2	100	By Process 1	50	9	450
To Costing Profit and Loss Account			350				
	50		450		50		450

(b) Statement of Profit

(attributable to each of the Joint Products according to weight of output and market value of production)

Joint products	Output	S.P. (p.u.)	Sales value	Joint cost apportionment according to			
				Weight of output	Profit/(loss)	Market value of production	Profit/ (loss)
	(kg.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)
A	900	24	21,600	13,500*	8,100	17,250**	4,350
B	800	18	14,400	12,000	2,400	11,500	2,900
C	600	12	7,200	9,000	(1,800)	5,750	1,450
	2,300		**43,200**	**34,500**	**8,700**	**34,500**	**8,700**

* Working Note 3

** Working Note 4

Working Notes:

1. Normal output = 2,500 kg. – 250 kg. (2,500 kg. × 10%) = 2,250 kg.

   Total Cost = Direct material cost + Direct labour cost + Overheads – Recovery from scrap sales

   = Rs. 10,000 + Rs. 6,250 + Rs. 4,500 – Rs. 500 (2,500 × 10% × Rs. 2)

   = Rs. 20,250

   Normal cost (p.u.) = $\frac{\text{Rs.}20,250}{2,250 \text{ kg}}$ = Rs.9

2. Joint Cost of three products under Process- 2

	(Rs.)
Transfer of output from process-1	20,700
Direct Labour	6,900
Overhead	6,900
Total	**34,500**

3. Apportionment of joint cost on the basis of weight of output

Joint Products	Output (in kg.)	Apportionment of joint cost on the basis of weight of output
A	900	$\frac{\text{Rs.34,500 x 9}}{23}$ =Rs.13,500
B	800	$\frac{\text{Rs.34,500 x 8}}{23}$ =Rs.12,000
C	600	$\frac{\text{Rs.34,500 x 6}}{23}$ =Rs.9,000

4. Apportionment of Joint Cost on the basis of market value of production

Joint Products	Output	Selling Price (p.u.)	Sale Revenue	Apportionment of Joint Cost on the basis of market value of production
	(In Kg.)	(Rs.)	(Rs.)	
A	900	24	21,600	$\frac{\text{Rs.34,500x3}}{6}$ =Rs.17,250
B	800	18	14,400	$\frac{\text{Rs.34,500x2}}{6}$ =Rs.11,500
C	600	12	7,200	$\frac{\text{Rs.34,500x1}}{6}$ =Rs.5,750
			43,200	**34,500**

(Q.3)

A company manufactures one main product (M_1) and two by-products B_1 and B_2. For the month of January 2013, following details are available:

Total Cost upto separation Point Rs. 2,12,400

	M_1	B_1	B_2
Cost after separation	-	Rs. 35,000	Rs. 24,000
No. of units produced	4,000	1,800	3,000
Selling price per unit	Rs. 100	Rs. 40	Rs. 30
Estimated net profit as percentage to sales value	-	20%	30%
Estimated selling expenses as percentage to sales value	20%	15%	15%

There are no beginning or closing inventories.

Prepare statement showing:

(i) Allocation of joint cost; and

(ii) Product-wise and overall profitability of the company for January 2013.

Solution:

(i) Statement showing allocation of Joint Cost

Particulars	**B_1**	**B_2**
No. of units Produced	1,800	3,000
Selling Price Per unit (Rs.)	40	30
Sales Value (Rs.)	72,000	90,000
Less: Estimated Profit (B_1 -20% & B_2 -30%)	(14,400)	(27,000)
Cost of Sales	57,600	63,000
Less: Estimated Selling Expenses (B_1 -15% & B_2 -15%)	(10,800)	(13,500)
Cost of Production	46,800	49,500
Less: Cost after separation	(35,000)	(24,000)
Joint Cost allocated	11,800	25,500

(ii) Statement of Profitability

Particulars	**M_1 (Rs.)**	**B_1 (Rs.)**	**B_2 (Rs.)**
Sales Value (A)	4,00,000(4,000 × Rs.100)	72,000	90,000
Less:- Joint Cost	1,75,100(2,12,400 -11,800 - 25,500)	11,800	25,500
- Cost after separation	-	35,000	24,000
- Selling Expenses (M_1- 20%, B_1-15% & B_2-15%)	80,000	10,800	13,500
(B)	2,55,100	57,600	63,000
Profit (A –B)	1,44,900	14,400	27,000

Overall Profit = Rs.1,44,900 + Rs.14,400 + Rs. 27,000 = Rs. 1,86,300

SERVICE SECTOR COSTING (OPERATING COSTING)

Q.1) A Mineral is transported from two mines – 'A' and 'B' and unloaded at plots in a Railway Station. Mine A is at a distance of 10 km., and B is at a distance of 15 km. from railhead plots. A fleet of lorries of 5 tonne carrying capacity is used for the transport of mineral from the mines. Records reveal that the lorries average a speed of 30 km. per hour, when running and regularly take 10 minutes to unload at the railhead. At mine 'A' loading time averages 30 minutes per load while at mine 'B' loading time averages 20 minutes per load.

Drivers' wages, depreciation, insurance and taxes are found to cost Rs. 9 per hour operated. Fuel, oil, tyres, repairs and maintenance cost Rs. 1.20 per km.

Draw up a statement, showing the cost per tonne-kilometer of carrying mineral from each mine.

Solution:

Statement showing the cost per tonne-kilometre of carrying mineral from each mine

	Mine A (Rs.)	**Mine B (Rs.)**
Fixed cost per trip: (Refer to working note 1)		
(Driver's wages, depreciation, insurance and taxes)		
A: 1 hour 20 minutes @ Rs. 9 per hour	12.00	
B: 1 hour 30 minutes @ Rs. 9 per hour		13.50
Running and maintenance cost:		
(Fuel, oil, tyres, repairs and maintenance)		
A: 20 km. Rs. 1.20 per km.	24.00	
B: 30 km. Rs. 1.20 per km.		36.00
Total cost per trip	36.00	49.50
Cost per tonne – km	0.72	0.66
(Refer to working note 2)	$\left(\frac{\text{Rs.36}}{\text{50 tonne-km}}\right)$	$\left(\frac{\text{Rs.49.50}}{\text{75 tonne-km}}\right)$

Working notes

	Mine- A	**Mine- B**
(1) Total operated time taken per trip		
Running time to & fro	40 minutes	60 minutes

	$\left(20 \text{ km. x } \frac{60 \text{ minutes}}{30 \text{ k.m.}}\right)$	$\left(30 \text{ km. x } \frac{60 \text{ minutes}}{30 \text{ k.m.}}\right)$
Un-loading time 10 minutes 10 minutes	10 minutes	10 minutes
Loading time 30 minutes 20 minutes	30 minutes	20 minutes
Total operated time 80 minutes or 90 minutes or	80 minutes or 1 hour 20 minutes	90 minutes or 1 hour 30 minutes
(2). Effective tones – km. 50	50 (5 tonnes × 10 km.)	75 (5 tonnes × 15 km.)

Q.2)

EPS is a Public School having 25 buses each plying in different directions for the transport of its school students. In view of large number of students availing of the bus service, the buses work two shifts daily both in the morning and in the afternoon. The buses are garaged in the school. The workload of the students has been so arranged that in the morning, the first trip picks up senior students and the second trip plying an hour later picks up junior students. Similarly, in the afternoon, the first trip takes the junior students and an hour later the second trip takes the senior students home. The distance travelled by each bus, one way is 16 km. The school works 24 days in a month and remains closed for vacation in May and June. The bus fee, however, is payable by the students for all the 12 months in a year.

The details of expenses for the year 2013-2014 are as under:

Driver's salary – payable for all the 12 in months.	Rs.5,000 per month per driver.
Cleaner's salary payable for all the 12 months (one cleaner has been employed for every five buses).	Rs.3,000 per month per cleaner
Licence Fees, Taxes etc.	Rs.2,300 per bus per annum
Insurance Premium	Rs.15,600 per bus per annum
Repairs and Maintenance	Rs.16,400 per bus per annum
Purchase price of the bus	Rs.16,50,000 each
Life of the bus	16 years
Scrap value	Rs.1,50,000
Diesel Cost	Rs.18.50 per litre

Each bus gives an average of 10 km. per litre of diesel. The seating capacity of each bus is 60students. The seating capacity is fully occupied during the whole year.

The school follows differential bus fees based on distance traveled as under:

Students picked up and dropped within the range of distance from the school	Bus fee	Percentage of students availing this facility
4 km.	25% of Full	15%
8 km.	50% of Full	30%
16 km.	Full	55%

Ignore interest. Since the bus fees has to be based on average cost, you are required to

(i) Prepare a statement showing the expenses of operating a single bus and the fleet of 25buses for a year.

(ii) Work out average cost per student per month in respect of:

(a) Students coming from a distance of upto 4 km. from the school.

(b) Students coming from a distance of upto 8 km. from the school; and

(c) Students coming from a distance of upto 16 km. from the school.

Solution :

(a) (i)

EPS Public School

Statement showing the expenses of operating a single bus and the fleet of 25 buses for a year

Particulars	Per bus per annum(Rs.)	Fleet of 25buses per annum(Rs.)
Running costs : (A)		
Diesel (Refer to working note 1)	56,832	14,20,800
Repairs & maintenance costs: (B)	16,400	4,10,000
Fixed charges:		
Driver's salary		
(Rs. 5,000 × 12 months)	60,000	15,00,000
Cleaners salary		
(Rs.3,000 × 1/5th × 12 months)	7,200	1,80,000
Licence fee, taxes etc.	2,300	57,500
Insurance	15,600	3,90,000
Depreciation	93,750	23,43,750
Total fixed charges: (C)	1,78,850	44,71,250
Total expenses: (A+B+C)	2,52,082	63,02,050

(ii) Average cost per student per month in respect of students coming from a distance of:

(a)	4 km. from the school	
	{Rs. 2,52,082 / (354 students × 12 months)}(Refer to Working Note 2)	Rs. 59.34
(b)	8 km. from the school (Rs. 59.34 ×2)	Rs. 118.68
(c)	16 km. from the school (Rs. 59.34 × 4)	Rs. 237.36

Working Notes:

1. Calculation of diesel cost per bus:

No. of trips made by a bus each day	4
Distance travelled in one trip both ways (16 km. × 2 trips)	32 km.
Distance traveled per day by a bus (32 km. × 4 shifts)	128 km.
Distance traveled during a month (128 km. × 24 days)	3,072 km.
Distance traveled per year (3,072 km. × 10 months)	30,720 km.
No. of litres of diesel required per bus per year(30,720 km. ÷ 10 km.)	3,072 litres
Cost of diesel per bus per year (3,072 litres × Rs. 18.50)	Rs. 56,832

2. Calculation of number of students per bus:

Bus capacity of 2 trips (60 students × 2 trips)	120 students
1/4th fare students (15% × 120 students)	18 students
½ fare 30% students (equivalent to 1/4th fare students)	72 students
Full fare 55% students (equivalent to 1/4th fare students)	264 students
Total 1/4th fare students	354 students

Q.3) A transport company has a fleet of three trucks of 10 tonnes capacity each plying in different directions for transport of customer's goods. The trucks run loaded with goods and return empty. The distance travelled, number of trips made and the load carried per day by each truck are as under:

Truck No.	One way Distance Km	No. of trips per day	Load carried per trip / day tonnes
1	16	4	6
2	40	2	9
3	30	3	8

The analysis of maintenance cost and the total distance travelled during the last two years is as under

Year	Total distance travelled	Maintenance Cost Rs.
1	1,60,200	46,050
2	1,56,700	45,175

The following are the details of expenses for the year under review:

Diesel	Rs. 10 per litre. Each litre gives 4 km per litre of diesel on an average.
Driver's salary	Rs. 2,000 per month
Licence and taxes	Rs. 5,000 per annum per truck
Insurance	Rs. 5,000 per annum for all the three vehicles
Purchase Price per truck	Rs. 3,00,000, Life 10 years. Scrap value at the end of life is Rs. 10,000.
Oil and sundries	Rs. 25 per 100 km run.
General Overhead	Rs. 11,084 per annum

The vehicles operate 24 days per month on an average.

Required

(i) Prepare an Annual Cost Statement covering the fleet of three vehicles.

(ii) Calculate the cost per km. run.

(iii) Determine the freight rate per tonne km. to yield a profit of 10% on freight.

Solution:

(i) Annual Cost Statement of three vehicles

	(Rs.)
Diesel {(1,34,784 km. ÷ 4 km) × Rs. 10) (Refer to Working Note 1)	3,36,960
Oil & sundries {(1,34,784 km. ÷ 100 km.) × Rs. 25}	33,696
Maintenance {(1,34,784 km. × Rs. 0.25) + Rs. 6,000} (Refer to Working Note 2)	39,696
Drivers' salary {(Rs. 2,000 × 12 months) × 3 trucks}	72,000
Licence and taxes (Rs. 5,000 × 3 trucks)	15,000
Insurance	5,000
Depreciation {(Rs. 2,90,000 ÷ 10 years) × 3 trucks}	87,000
General overhead	11,084
Total annual cost	6,00,436

(ii) Cost per km. run

Cost per kilometer run

$$= \frac{\text{Total annual cost of vehicles}}{\text{Total kilometre travelled annually}} \text{ (Refer to Working Note 1)}$$

$$= \frac{Rs.6,00,436}{1,34,784 \text{ kms}} = Rs.4.4548$$

(iii) Freight rate per tonne km (to yield a profit of 10% on freight)

Cost per tonne km.

$$= \frac{\text{Total annual cost of three vehicles}}{\text{Total effective tonnes kms. per annum}} \text{ (Refer to Working Note 1)}$$

$$= \frac{\text{Rs.6,00,436}}{5,25,312 \text{ kms}} = Rs.1.143$$

Freight rate per tonne km. $\left(\frac{Rs.1.143}{0.9}\right)$ x 1 = Rs.1.27

Working Notes:

1. Total kilometre travelled and tonnes kilometre (load carried) by three trucks in one year

Truck number	One way distance in kms	No. of trips (up & down)	Total distance covered in km per day	Load carried per trip / day in tonnes	Total effective tonnes km
1	16	4	128	6	384
2	40	2	160	9	720
3	30	3	180	8	720
Total			468		1,824

Total kilometre travelled by three trucks in one year

(468 km. × 24 days × 12 months) = 1,34,784

Total effective tonnes kilometre of load carried by three trucks during one year

(1,824 tonnes km. × 24 days × 12 months) = 5,25,312

2. Fixed and variable component of maintenance cost:

Variable maintenance cost per km

$$= \frac{\text{Difference in maintenance cost}}{\text{Difference in distance travelled}}$$

$$= \frac{\text{Rs.46,050-Rs.45,175}}{1,60,200 \text{ kms - } 1,56,700 \text{ kms}}$$

= Rs. 0.25

Fixed maintenance cost = Total maintenance cost–Variable maintenance cost

= Rs. 46,050 – 1,60,200 kms × Rs. 0.25

= Rs. 6,000

Q.4) Gopal Milk Co-Operative Society (GMCS) collects raw milk from the farmers of Ramgarh, Pratapgarh and Devgarh panchayats and processes these milk to make various dairy products. GMCS has its own vehicles (tankers) to collect and bring the milk to the processing plant. Vehicles are parked in the GMCS's garage situated within the plant compound.

Following are the some information related with the vehicles:

	Ramgarh	Pratapgarh	Devgarh
No. of vehicles assigned	4	3	5
No. of trips a day	3	2	2
One way distance from the processing plant	24 k.m.	34 k.m.	16 k.m.
Toll tax paid p.m. (Rs.)	2,850	3,020	—

All the 5 vehicles assigned to Devgarh panchayat, were purchased five years back at a cost of Rs. 9,25,000 each. The 4 vehicles assigned to Ramgarh panchayat, were purchased two years back at a cost of Rs. 11,02,000 each and the remaining vehicles assigned to Pratapgarh were purchased last year at a cost of Rs. 13,12,000 each. With the purchase of each vehicle a two years free servicing warranty is provided. A vehicle gives 10 kmpl mileage in the first two year of purchase, 8 kmpl in next two years and 6 kmpl afterwards. The vehicles are subject to depreciation of 10% p.a. on straight line basis irrespective of usage. A vehicle has the capacity to carry 25,000 litres of milk but on an average only 70% of the total capacity is utilized.

The following expenditure is related with the vehicles:

Salary of Driver (a driver for each vehicle)	Rs. 18,000 p.m.
Salary to Cleaner (a cleaner for each vehicle)	Rs. 11,000 p.m.
Allocated garage parking fee	Rs. 1,350 per vehicle per month
Servicing cost	Rs. 3,000 for every complete 5,000 k.m. run.
Price of diesel per litre	Rs. 58.00

From the above information you are required to calculate

(i) Total operating cost per month for each vehicle. (Take 30 days for the month)

(ii) Vehicle operating cost per litre of milk.

Solution:

(i) Calculation of Operating Cost per month for each vehicle

		Ramgarh	Pratapgarh	Devgarh	Total
A.	**Running Costs:**				
-	Cost of diesel (Working Note- 2)	1,25,280	70,992	92,800	2,89,072
-	Servicing cost (Working Note- 3)	9,000	—	3,000	12,000
		1,34,280	**70,992**	**95,800**	**3,01,072**

B.	**Fixed Costs:**				
-	Salary to drivers	72,000 (4 drivers × Rs. 18,000)	54,000 (3 drivers × Rs. 18,000)	90,000 (5 drivers × Rs. 18,000)	2,16,000
-	Salary to cleaners	44,000 (4 cleaners × Rs. 11,000)	33,000 (3 cleaners × Rs. 11,000)	55,000 (5 cleaners × Rs. 11,000)	1,32,000
-	Allocated garage parking fee	5,400 (4 vehicles × Rs. 1,350)	4,050 (3 vehicles × Rs. 1,350)	6,750 (5 vehicles × Rs. 1,350)	16,200
-	Depreciation (Working Note- 4)	36,733	32,800	38,542	1,08,075
-	Toll tax passes	2,850	3,020	—	5,870
		1,60,983	1,26,870	1,90,292	4,78,145
	Total [A + B]	**2,95,263**	**1,97,862**	**2,86,092**	**7,79,217**
Operating Cost per vehicle		73,815.75 (Rs. 2,95,263 ÷ 4 vehicles)	65,954 (Rs. 1,97,862 ÷ 3 vehicles)	57,218.40 (Rs. 2,86,092 ÷ 5 vehicles)	64,934.75 (Rs. 7,79,217 ÷ 12 vehicles)

(ii) Vehicle operating cost per litre of milk

$$\frac{\text{Total Operating Cost per month}}{\text{Total milk carried a month}} = \frac{Rs.7,79,217}{1,47,00,000 \text{ Litres (Working Note-5)}} = Rs.0.053$$

Working Notes:

1. Distance covered by the vehicles in a month

Route		Total Distance (in K.M.)
Ramgarh	(4 vehicles × 3 trips × 2 × 24 km. × 30 days)	17,280
Pratapgarh	(3 vehicles × 2 trips × 2 × 34 km. × 30 days)	12,240
Devgarh	(5 vehicles × 2 trips × 2 × 16 km. × 30 days)	9,600

2. Cost of diesel consumption

	Ramgarh	Pratapgarh	Devgarh
Total distance travelled (K.M.)	17,280	12,240	9,600
Mileage per litre of diesel	8 kmpl	10 kmpl	6 kmpl
Diesel consumption (Litre)	2,160 (17,280 ÷ 8)	1,224 (12,240 ÷ 10)	1,600 (9,600 ÷ 6)
Cost of diesel consumption @ Rs. 58 per litre (Rs.)	1,25,280	70,992	92,800

3. Servicing Cost

	Ramgarh	Pratapgarh	Devgarh
Total distance travelled (K.M.)	17,280	12,240	9,600
Covered under free service warranty	No	Yes	No
No. of services required	3 (17,280 k.m. ÷ 5,000 k.m.)	2 (12,240 k.m. ÷ 5,000 k.m.)	1 (9,600 k.m. ÷ 5,000 k.m.)
Total Service Cost (Rs.)	9,000 (Rs. 3,000 × 3)	—	3,000 (Rs. 3,000 × 1)

4. Calculation of Depreciation

	Ramgarh	Pratapgarh	Devgarh
No. of vehicles	4	3	5
Cost of a vehicle	11,02,000	13,12,000	9,25,000
Total Cost of vehicles	44,08,000	39,36,000	46,25,000
Depreciation per month	36,733 $\left(\frac{Rs.44,08,000 \times 10\%}{12 \text{ months}}\right)$ $\left(\frac{Rs.46,25,000 \times 10\%}{12 \text{ months}}\right)$	32,800 $\left(\frac{Rs.39,36,000 \times 10\%}{12 \text{ months}}\right)$	38,542

5. Total volume of Milk Carried

Route		Milk Qty. (Litre)
Ramgarh	(25,000 ltr. × 0.7 × 4 vehicles × 3 trips × 30 days)	63,00,000
Pratapgarh	(25,000 ltr. × 0.7 × 3 vehicles × 2 trips × 30 days)	31,50,000
Devgarh	(25,000 ltr. × 0.7 × 5 vehicles × 2 trips × 30 days)	52,50,000
		1,47,00,000

CONTRACT COSTING

Q.1) Paramount Engineers are engaged in construction and erection of a bridge under a long-term contract. The cost incurred upto 31.03.2014 was as under:

	Amount (Rs.) in lakhs
Fabrication Costs:	
Direct Materials	280
Direct Labour	100
Overheads	60
	440
Erection Cost to date	110
	550

The contract price is Rs. 11 crores and the cash received on account till 31.03.2014 was Rs. 6 crores. The technical estimate of the contract indicates the following degree of completion of work. Fabrication – Direct Material – 70%, Director Labour and Overheads 60% Erection – 40%.

You are required to estimate the profit that could be taken to Costing Profit and Loss Account against this partly completed contract as at 31.03.2014.

Solution

Working Notes :

1. Statement showing estimated profit to date and future profit on the completion of contract

Particulars	**Cost to date**		**Further Costs**		**Total Cost (Rs.) (a) + (b)**
	(%) Completion to date	**Amount (Rs.) (a)**	**(%) Completion to be done**	**Amount (Rs.) (b)**	
Fabrication costs:					
Direct material	70	280.00	30	120.00	400.00
Direct labour	60	100.00	40	66.67	166.67
Overheads	60	60.00	40	40.00	100.00
Total Fabrication cost (A)		440.00		226.67	666.67
Erection cost: (B)	40	110.00	60	165.00	275.00
Total estimated costs (A+B)		550.00		391.67	941.67
Profit		92.48		65.85	158.33
		642.		48	457.52

2. Profit to date (Notional Profit) and future profit are calculated as below:

$$\text{Profit to date (Notional Profit)} = \frac{\text{Estimated profit on the whole contract x Cost to date}}{\text{Total Cost}}$$

$$= \frac{\text{Rs.158.33 x Rs.550}}{\text{Rs.941.67}} = \text{Rs.92.48(lakhs)}$$

Future Profit = Rs. 158.33 – Rs. 92.48 = Rs. 65.85

3. Work certified:

= Cost of the contract to date + Profit to date

= Rs. 550 + Rs. 92.48 = Rs. 642.48 lakhs

Q.2) A construction company undertook a contract at an estimated price of Rs. 108 lakhs, which includes a budgeted profit of Rs. 18 lakhs. The relevant data for the year ended 31.03.2014 are as under:

	(Rs. Rs.000)
Materials issued to site	5,000
Direct wages paid	3,800
Plant hired	700
Site office costs	270
Materials returned from site	100
Direct expenses	500
Work certified	10,000
Progress payment received	7,200

A special plant was purchased specifically for this contract at Rs. 8,00,000 and after use on this contract till the end of 31.02.2014, it was valued at Rs. 5,00,000. This cost of materials at site at the end of the year was estimated at Rs. 18,00,000. Direct wages accrued as on 31.03.2014 was Rs. 1,10,000.

Required

Prepare the Contract Account for the year ended 31st March, 2014 and compute the profit to be taken to the Costing Profit and Loss account.

Solution

Contract Account for the year ended 31st March, 2014

		(Rs.Rs.000)		**(Rs.Rs. 000)**
To Material issued to site		5,000	By Material at site	1,800
To Direct wages	3,800		By Material returned	100
Add: Outstanding wages	110	3,910	By Cost of contract	8,780
To Plant hire		700		
To Site office cost		270		
To Direct expenses		500		
To Depreciation (special plant)		300		
		10,680		**10,680**
To Cost of contract		8,780	By Work certified	10,000
To Profit & Loss A/c		1,220		
		10,000		**10,000**

Q.3)

PQR Construction Ltd. commenced a contract on April 1, 2013. The total contract was for Rs. 27,12,500. It was decided to estimate the total profit and to take to the credit of Costing P & L A/c the proportion of estimated profit on cash basis which work completed bear to the total contract. Actual expenditure in 2013-14 and estimated expenditure in 2014-15 are given below:

	2013-14 Actual (Rs.)	**2014-15 Estimated (Rs.)**
Material issued	4,56,000	8,14,000
Labour : Paid	3,05,000	3,80,000
: Outstanding at end	24,000	37,500
Plant purchased	2,25,000	–
Expenses : Paid	1,00,000	1,75,000
: Outstanding at the end	–	25,000
: Prepaid at the end	22,500	–
Plant returned to stores (a historical stores)	75,000	1,50,000 (on Dec. 31 2014)
Material at site	30,000	75,000
Work-in progress certified	12,75,000	Full
Work-in-progress uncertified	40,000	——
Cash received	10,00,000	Full

The plant is subject to annual depreciation @ 20% of WDV cost. The contract is likely to be completed on December 31, 2014.

Required:

(i) Prepare the Contract A/c for the year 2013-14.

(ii) Estimate the profit on the contract for the year 2013-14 on prudent basis which has to be credited to Costing P & L A/c.

Solution :

PQR Construction Ltd.

Contract A/c

(April 1, 2013 to March 31, 2014)

Particulars		Amount (Rs.)	Particulars		Amount (Rs.)
To Materials Issued		4,56,000	By Plant returned to Stores		
			(Working Note 1)		60,000
To Labour	3,05,000		By Materials at Site		30,000
Add: Outstanding	24,000	3,29,000	By W.I.P.		
To Plant Purchased		2,25,000	Certified	12,75,000	
To Expenses	1,00,000		Uncertified	40,000	13,15,000
Less: Prepaid	22,500	77,500	By Plant at Site		
			(Working Note 2)		1,20,000
To Notional Profit c/d		4,37,500			
		15,25,000			**15,25,000**
To Costing Profit & Loss A/c		4,37,500	By Notional Profit b/d		4,37,500
		4,37,500			**4,37,500**

PQR Construction Ltd.

Contract A/c

(April 1, 2013 to December 31, 2014)

(For Computing estimated profit)

Particulars	Amount (Rs.)	Particulars	Amount (Rs.)
To Materials Issued	12,70,000	By Material at Site	75,000
(Rs. 4,56,000+ Rs. 8,14,000)			
To Labour Cost	7,22,500	By Plant returned to	
(Rs. 3,05,000 + Rs. 24,000 + Rs.3,56,000* + Rs. 37,500)		Stores on 31.3.2014.	60,000
To Plant purchased	2,25,000	By Plant returned to	
		Stores on 31.12.2014	
To Expenses		(Working Note 3)	1,02,000
(Rs. 77,500 + Rs. 1,97,500 +Rs.25,000)	3,00,000	By Contractee A/c	27,12,500
To Estimated profit	4,32,000		
	29,49,500		**29,49,500**

* Labour paid in 2014-15: Rs. 3,80,000 – Rs. 24,000 = Rs. 3,56,000

Working Notes

		(Rs.)
1.	**Value of the Plant returned to Stores on 31.03.2014**	
	Historical Cost of the Plant returned	75,000
	Less: Depreciation @ 20% of WDV for one year	(15,000)
		60,000
2.	**Value of Plant at Site 31.03.2014**	
	Historical Cost of Plant at Site (Rs. 2,25,000 – Rs. 75,000)	1,50,000
	Less: Depreciation @ 20% on WDV for one year	(30,000)
		1,20,000
3.	**Value of Plant returned to Stores on 31.12.2014**	
	Value of Plant (WDV) on 31.3.2014	1,20,000
	Less: Depreciation @ 20% of WDV for a period of 9 months	(18,000)
		1,02,000
4.	**Expenses Paid for the year 2013-14**	
	Total expenses paid	1,00,000
	Less: Pre-paid at the end	(22,500)
		77,500
5.	**Profit to be credited to Costing Profit & Loss A/c** on March 31,2014 for the Contract likely to be completed on December 31,2014.	
	Estimated Profit $\times \frac{\text{Work Certified}}{\text{Total Contract Price}} \times \frac{\text{Cash received}}{\text{Work Certified}}$	
	Rs.4,32,000 x $\frac{12,75,000}{27,12,500}$ x $\frac{10,00,000}{12,75,000}$	1,59,263

MATERIAL

Q.1) A company manufactures 5,000 units of a product per month. The cost of placing an order is Rs.100. The purchase price of the raw material is Rs. 10 per kg. The re-order period is 4 to 8 weeks. The consumption of raw materials varies from 100 kg to 450 kg per week, the average consumption being 275 kg. The carrying cost of inventory is 20% per annum.

You are required to calculate

(i) Re-order quantity (ii) Re-order level

(iii) Maximum level (iv) Minimum level

(v) Average stock level

Solution:

(i) Reorder Quantity (ROQ) = 1,196 kg. (Refer to working note)

(ii) Reorder level (ROL) = Maximum usage × Maximum re-order period

= 450 kg. × 8 weeks = 3,600 kg.

(iii) Maximum level = ROL + ROQ – (Min. usage × Min. re-order period)

= 3,600 kg. + 1,196 kg. – (100 kg.× 4 weeks)

= 4,396 kg.

(iv) Minimum level = ROL – (Normal usage × Normal re-order period)

= 3,600 kg. – (275 kg. × 6 weeks)

= 1,950 kg.

(v) Average stock level = $\frac{1}{2}$ (Maximum level + Minimum level)

= $\frac{1}{2}$ (4,396 kg. + 1,950 kg.) = 3,173 kg.

OR

= Minimum level + $\frac{1}{2}$ ROQ

= 1,950 kg. + $\frac{1}{2}$ × 1,196 kg. = 2,548 kg.

Working Note

Annual consumption of raw material (A) = (275 kg. × 52 weeks) = 14,300 kg.

Cost of placing an order (O) = Rs. 100

Carrying cost per kg. Per annum (c × i) = Rs. 10 × 20% = Rs. 2

Economic order quantity (EOQ) = $\sqrt{\frac{2AO}{Cxi}}$

=

$$\sqrt{\frac{2 \text{ x } 14{,}300 \text{ kgs. x Rs.}100}{\text{Rs.}2}} = 1{,}196 \text{ kg. (Approx.)}$$

(Q.2) The quarterly production of a company's product which has a steady market is 20,000 units. Each unit of a product requires 0.5 kg. of raw material. The cost of placing one order for raw material is Rs. 100 and the inventory carrying cost is Rs. 2 per annum. The lead time for procurement of raw material is 36 days and a safety stock of 1,000 kg. of raw materials is maintained by the company. The company has been able to negotiate the following discount structure with the raw material supplier.

Order quantity (kg.)	**Discount (Rs.)**
Upto 6,000	NIL
6,001 – 8,000	400
8,001 – 16,000	2,000
16,001 – 30,000	3,200
30,001 – 45,000	4,000

You are required to

(i) Calculate the re-order point taking 30 days in a month.

(ii) Prepare a statement showing the total cost of procurement and storage of raw material after considering the discount of the company elects to place one, two, four or six orders in the year.

(iii) State the number of orders which the company should place to minimize the costs after taking EOQ also into consideration.

Solution:

Working notes

1. Annual production (20,000 units per quarter × 4 quarters) = 80,000 units
2. Raw material required for 80,000 units (80,000 units × 0.5 kg.) = 40,000 kg.
3. EOQ = $\sqrt{\frac{2 \text{ x } 40{,}000 \text{ kgs x Rs.}100}{\text{Rs.}2}} = 2{,}000 \text{ kgs.}$
4. Total cost of procurement and storage when the order size is equal to EOQ or 2,000 kg.

No. of orders (40,000 kg. ÷ 2,000 kg.)	= 20 times
Ordering cost (20 orders × Rs.100)	= Rs. 2,000
Carrying cost (Rs.)(½ × 2,000 kg. × Rs. 2)	= Rs. 2,000
Total cost	Rs. 4,000

(i) Re-order point = Safety stock + Lead time consumption

$$= 1{,}000 \text{ kg.} + \frac{40{,}000 \text{ kg.}}{360 \text{ days}} \times 36 \text{ days}$$

$$= 1{,}000 \text{ kg.} + 4{,}000 \text{ kg.} = 5{,}000 \text{ kg.}$$

(ii) Statement showing the total cost of procurement and storage of raw materials (after considering the discount)

Order size	No. of orders	Total cost of procurement	Average stock	Total cost of storage of raw materials	Discount	Total cost
Kg.		(Rs.)	Kg.	(Rs.)	(Rs.)	(Rs.)
(1)	(2)	(3)=(2)×Rs.100	(4)=½×(1)	(5)=(4)×Rs.2	(6)	(7)=[(3)+(5)–(6)
40,000	1	100	20,000	40,000	4,000	36,100
20,000	2	200	10,000	20,000	3,200	17,000
10,000	4	400	5,000	10,000	2,000	8,400
6666.66	6	600	3,333	6,666	400	6,866

(iii) Number of orders which the company should place to minimize the costs after taking EOQ also into consideration is 20 orders each of size 2,000 kg. The total cost of procurement and storage in this case comes to Rs. 4,000, which is minimum.

(Q.3) PQR Ltd., manufactures a special product, which requires 'ZED'. The following particulars were collected for the year 2013-14:

(i) Monthly demand of Zed : 7,500 units

(ii) Cost of placing an order : Rs. 500

(iii) Re-order period : 5 to 8 weeks

(iv) Cost per unit : Rs. 60

(v) Carrying cost p.a. : 10%

(vi) Normal usage : 500 units per week

(vii) Minimum usage : 250 units per week

(viii) Maximum usage : 750 units per week

Required:

(i) Re-order quantity.

(ii) Re-order level.

(iii) Minimum stock level.

(iv) Maximum stock level.

(v) Average stock level.

Solution :

(i) Re - order quantity $= \sqrt{\frac{2AO}{Cxi}}$

$$= \sqrt{\frac{2 \times 7{,}500 \text{ units} \times 12 \text{ months} \times Rs.500}{Rs.60 \times 10\%}}$$

= 3,873 units (Approx)

(ii) Re-order level

= Maximum re-order period x Maximum usage

= 8 weeks × 750 units per week = 6,000 units

(iii) Minimum stock level

= Re-order level – {Normal usage x Normal re-order period}

= 6,000 units – (500 units x 6.5 weeks) = 2,750 units

(iv) Maximum stock level

= Re-order level + Re-order quantity – (Minimum usage x Minimum re-order period)

= 6,000 units + 3,873 units – (250 units x 5 weeks) = 8,623 units

(v) Average stock level

= ½ (Minimum stock level + Maximum stock level)

= ½ (2,750 + 8,623) = 5,686.5 units or 5,687 units

(Q.4)

Re-order quantity of material 'X' is 5,000 kg.; Maximum level 8,000 kg.; Minimum usage 50 kg. per hour; minimum re-order period 4 days; daily working hours in the factory is 8 hours. You are required to calculate the re-order level of material 'X'.

Solution:

Maximum Level = Re-order level + Re-order Quantity- (Min. usage × Min. Re-order Period)

Re-order Level = Maximum Level – [Re-order Quantity – (Min. usage × Min. Re-order Period)

= 8,000 kg. – [5,000 kg. – (400 kg* × 4 days)] = 8,000 kg. – 3,400 kg. = 4,600 kg.

Hence, Re-order level is 4,600 kg.

*Minimum usage per day = 50 kg. × 8 hours = 400 kg.

(Q.5) Primex Limited produces product 'P'. It uses annually 60,000 units of a material 'Rex' costing Rs. 10 per unit. Other relevant information are:

Cost of placing an order : Rs. 800 per order

Carrying cost : 15% per annum of average inventory

Re-order period : 10 days

Safety stock : 600 units

The company operates 300 days in a year.

You are required to calculated:

(i) Economic Order Quantity for material 'Rex'

(ii) Re-order Level

(iii) Maximum Stock Level

(iv) Average Stock Level

Solution :

(i) Economic Order Quantity (E.O.Q)

$$= \sqrt{\frac{2 \text{ x Annual requirement of 'Rex' x Orderingcost per order}}{\text{Annual carrying cost per unit per annum}}}$$

$$= \sqrt{\frac{2 \text{ x } 60{,}000 \text{ units x Rs.}800}{\text{Rs.}10 \text{ x } 15\%}} \quad = \sqrt{\frac{9{,}60{,}00{,}000}{Rs.1.5}}$$

$= 8{,}000$ units

(ii) Re-order Level = Safety Stock + (Normal daily Usage × Re-order period)

$$= 600 + \left(\frac{60{,}000 \text{ units}}{300 \text{ days}} \text{ x } 10 \text{ days} \right)$$

$= 600 + 2{,}000$

$= 2{,}600$ units

(iii) Maximum Stock Level = E.O.Q (Re-order Quantity) + Safety Stock

$= 8{,}000$ units $+ 600$ units

$= 8{,}600$ units

(iv) Average Stock Level = Minimum Stock level + $\frac{1}{2}$ Re-order Quantity

$= 600^{*} + \frac{1}{2}$ 8,000 units

$= 4{,}600$ units

OR

$$\text{Average Stock Level} = \frac{\text{Maximum Stock level + Minimum Stock Level}}{2}$$

$$= \frac{8{,}600 \text{ units} + 600 \text{ units}}{2}$$

$= 4{,}600$ units

* Minimum Stock Level = Re-order level – (Normal daily usage × Re-order period)

$$= 2{,}600 - \left(\frac{60{,}000 \text{ units}}{300 \text{ units}} \text{ x } 10 \text{ days} \right)$$

$= 2{,}600 - 2{,}000$

$= 600$ units

OR

Minimum Stock Level = Safety Stock level = 600 units

(Q.6) Following details are related to a manufacturing concern:

Re-order Level	16,000 units
Economic Order Quality	90,000
Minimum Stock Level	100000 units
Maximum Stock Level	190000 units
Average Lead Time	6 days
Difference between minimum lead time and Maximum lead time	4 days

Calculate:

(i) Maximum consumption per day

(ii) Minimum consumption per day

Solution:

Difference between Minimum lead time Maximum lead time = 4 days

Max. lead time – Min. lead time = 4 days

Or, Max. lead time = Min. lead time + 4 days.....(i)

Average lead time is given as 6 days i.e.

$$\frac{\text{Max. lead time + Min. lead time}}{2} = 6 \text{ days} \quad \text{..... (ii)}$$

Putting the value of (i) in (ii),

$$\frac{\text{Max. lead time + Min. lead time}}{2} = 6 \text{ days}$$

Or, Min. lead time + 4 days + Min. lead time = 12 days

Or, 2 Min. lead time = 8 days

Or, Minimum lead time $\frac{8 \text{ days}}{2}$ = 4 days

Putting this Minimum lead time value in (i), we get

Maximum lead time = 4 days + 4 days = 8 days

(i) Maximum consumption per day:

Re-order level = Max. Re-order period × Maximum Consumption per day

1,60,000 units = 8 days × Maximum Consumption per day

Or, Maximum Consumption per day = $\frac{1,60,000 \text{ units}}{8 \text{ days}} = 20,000 \text{ units}$

(ii) Minimum Consumption per day:

Maximum Stock Level =

Re-order level + Re-order Quantity – (Min. lead time × Min. Consumption per day)

Or, 1,90,000 units = 1,60,000 units + 90,000 units – (4 days × Min. Consumption per day)

Or, 4 days × Min. Consumption per day = 2,50,000 units – 1,90,000 units

Or, Minimum Consumption per day = $\frac{60{,}000 \text{ units}}{4 \text{ days}} = 15{,}000 \text{ units}$

EMPLOYEE COST & DIRECT EXPENSES

Q.1) ZED Limited is working by employing 50 skilled workers, it is considering the introduction of incentive scheme-either Halsey scheme (with 50% bonus) or Rowan scheme of wage payment for increasing the labour productivity to cope up the increasing demand for the product by 40%. It is believed that proposed incentive scheme could bring about an average 20% increase over the present earnings of the workers; it could act as sufficient incentive for them to produce more.

Because of assurance, the increase in productivity has been observed as revealed by the figures for the month of April, 2014.

Hourly rate of wages (guaranteed)	Rs. 30
Average time for producing one unit by one worker at the previous performance (This may be taken as time allowed)	1.975 hours
Number of working days in the month	24
Number of working hours per day of each worker	8
Actual production during the month	6,120 units

Required:

(i) Calculate the effective rate of earnings under the Halsey scheme and the Rowan scheme.

(ii) Calculate the savings to the ZED Limited in terms of direct labour cost per piece.

(iii) Advise ZED Limited about the selection of the scheme to fulfill their assurance.

Solution:

Working notes:

1. Computation of time saved (in hours) per month:

(Standard production time for 6,120 units) – (Actual time taken by the workers)

= (6,120 units × 1.975 hours) – (24 days × 8 hours per day × 50 skilled workers)

= (12,087 hours – 9,600 hours)

= 2,487 hours

2. Computation of bonus for time saved under Halsey and Rowan schemes:

Time saved = 2,487 hours

(Refer to working note 1)

Wage rate per hour = Rs. 30

Bonus under Halsey Scheme = ½ × 2,487 hours × Rs. 30

(With 50% bonus) = Rs. 37,305

Bonus under Rowan Scheme $= \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Rate per hour}$

$= \frac{2,487 \text{ hours}}{12,087 \text{ hours}} \times 9,600 \text{ hours} \times \text{Rs. } 30$

= Rs. 59,258.38

(i) Computation of effective rate of earnings under the Halsey and Rowan scheme:

Total earnings (under Halsey scheme) (Refer to working note 2)

= Time wages + Bonus

= (24 days × 8 hours + 50 skilled workers × Rs. 30) + Rs. 37,305

= Rs. 2,88,000 + Rs. 37,305 = Rs. 3,25,305

Total earnings (under Rowan scheme) (Refer to working note 2)

= Time wages + Bonus

= Rs. 2,88,000 + Rs. 59,258.38

= Rs. 3,47,258.38

Effective rate of earnings per hour (under Halsey Plan) = $\frac{\text{Rs.3,25,305}}{\text{9,600 hours}}$ =Rs.33.89

Effective rate of earnings per hour (under Rowan Plan) = $\frac{\text{Rs.3,47,258.38}}{\text{9,600 hours}}$ =Rs.36.17

(ii) Savings to the ZED Ltd., in terms of direct labour cost per piece:

	(Rs.)
Direct labour cost (per unit) under time wages system (1.975 hours per unit × Rs. 30)	59.25
Direct labour cost (per unit) under Halsey Plan $\left(\frac{Rs.3,25,305}{6,120 \text{ units}}\right)$	53.15
Direct labour cost (per unit) under Rowan Plan $\left(\frac{Rs.3,47,258.38}{6,120 \text{ units}}\right)$	Rs. 56.74

Saving of direct labour cost under:

Halsey Plan (Rs. 59.25 – Rs. 53.15) Rs. 6.10

Rowan Plan (Rs. 59.25 – Rs. 56.74) Rs. 2.51

(iii) Advise to ZED Ltd.: (about the selection of the scheme to fulfill assurance)

Halsey scheme brings more savings to the management of ZED Ltd., over the present earnings of Rs. 2,88,000 but the other scheme i.e. Rowan scheme fulfils the promise of 20% increase over the present earnings of Rs. 2,88,000 by paying 20.58% in the form of bonus. Hence Rowan Plan may be adopted.

(Q.2) Two workmen, Andrew and Baker, produce the same product using the same material. Andrew is paid bonus according to Halsey plan, while Baker is paid bonus according to Rowan plan. The time allowed to manufacture the product is 100 hours. Andrew has taken 60 hours and Baker has taken 80 hours to complete the product. The normal hourly rate of wages of workman Andrew is Rs. 24 per hour. The total earnings of both the workers are same. Calculate normal hourly rate of wages of workman Baker.

Solution:

	Andrew	Baker
Time allowed (Hours)	100	100
Time taken (Hours)	60	80
Time saved (Hours)	40	20
Let the rate of wages of the worker Baker is 'L' per hour		
Normal Wages	Rs. 1,440	Rs. 80 L
	(60 hours× Rs.24)	(80 hours× L)
Bonus	Rs. 480*	Rs. 16 L**
Total earnings	Rs. 1,920	Rs. 96 L

* Bonus under Halsey system = $\frac{1}{2}$ x Time saved x Rate per hour

$= \frac{1}{2}$ x 40 hours x Rs.24 = Rs.480

** Bonus under Rowan system = $\frac{\text{Time Saved}}{\text{Time allowed}}$ x Time worked x Rate per hour

$= \frac{20 \text{ hours}}{100 \text{ hours}}$ x 80 hours x L = 16 L

According to the problem,

Total earnings of Andrew = Total earnings of Baker

Rs. 1,920 = Rs. 96 L

L = Rs. 20

Therefore, Hourly rate of wages of Baker is Rs. 20 per hour.

(Q.3) Standard Time for a job is 90 hours. The hourly rate of guaranteed wages is Rs. 50. Because of the saving in time a worker A gets an effective hourly rate of wages of Rs. 60 under Rowan premium bonus system. For the same saving in time, calculate the hourly rate of wages a worker B will get under Halsey premium bonus system assuring 40% to worker.

Solution:

Increase in hourly rate of wages under Rowan Plan is Rs. 10 i.e.(Rs. 60 – Rs. 50)

This is Equal to $\frac{\text{Time Saved}}{\text{Time Allowed}}$ x Rate per hour (Please refer Working Note)

Or, $\frac{\text{Time Saved}}{\text{Time Allowed}}$ x Rs.50 =Rs.10

Or, $\frac{\text{Time Saved}}{90 \text{ hours}}$ x Rs.50 =Rs.10

Therefore, Time Saved = 18 hours and Time Taken is 72 hours i.e. (90 hours – 18 hours)

Effective Hourly Rate under Halsey System:

Time saved = 18 hours

Bonus @ 40% = 18 hours × 40% × Rs. 50 = Rs. 360

Total Wages = (Rs.50 × 72 hours + Rs.360) = Rs. 3,960

Effective Hourly Rate = Rs. 3,960 ÷ 72 hours = Rs. 55

Working Note:

Effective hourly rate

$$= \frac{\left(\text{Time Taken x Rate per hour}\right) + \frac{\text{Time Taken}}{\text{Time Allowed}} \text{ x Time Saved x Rate per hour}}{\text{Time Taken}}$$

$$\text{Or, Rs.60} = \frac{\text{Time Taken x Rate per hour}}{\text{Time Taken}} + \frac{\frac{\text{Time Taken}}{\text{Time Allowed}} \text{ x Time Saved x Rate per hour}}{\text{Time Taken}}$$

or, Rs.60 -

$$\frac{\text{Time Taken x Rate per hour}}{\text{Time Taken}} = \frac{\text{Time Taken}}{\text{Time Allowed}} \text{ x Time Saved x Rate per hour} = \frac{1}{\text{Time Taken}}$$

$$\text{Or, Rs.60 – Rs.50} = \frac{\text{Time Saved}}{\text{Time Allowed}} \text{ x Rs.50}$$

(Q.4) The management of a company wants to formulate an incentive plan for the workers with a view to increase productivity. The following particulars have been extracted from the books of company:

Piece Wage rate Rs. 10

Weekly working hours 40

Hourly wages rate Rs. 40 (guaranteed)

Standard/normal time per unit 15 minutes.

Actual output for a week:

Worker A: 176 pieces

Worker B: 140 pieces

Differential piece rate: 80% of piece rate when output below normal and 120% of piece rate when output above normal.

Under Halsey scheme, worker gets a bonus equal to 50% of Wages of time saved.

Calculate:

(i) Earning of workers under Halsey's and Rowan's premium scheme.

(ii) Earning of workers under Taylor's differential piece rate system and Emerson's efficiency plan.

Solution:

Calculation of earnings for workers under different incentive plans:

(i) Halsey's Premium Plan:

	Worker – A	**Worker – B**
Actual time taken	40 hours	40 hours
Standard time for actual	44 hours	35 hours
Production	$\left(\frac{176 \text{ pcs x } 15 \text{ Min.}}{60 \text{ min}}\right)$	$\left(\frac{140 \text{ pcs x } 15 \text{ min.}}{60\text{min.}}\right)$
Minimum Wages	Rs. 1,600	Rs. 1,600
	(40 hours x Rs. 40)	(40 hours x Rs. 40)
Bonus	Rs. 80	No bonus
	{50% (44-40) x Rs.40}	
Earning	Rs. 1,680	Rs. 1,600
Rowan's Premium Plan:		
Minimum Wages (as above)	Rs. 1,600	Rs. 1,600
Bonus	= Rs. 145.45	No bonus
	$\left(\frac{4 \text{ Hours}}{44 \text{ Hours}} \text{ x } 40 \text{ hours x Rs.}40\right)$	
Earning	Rs. 1,745.45	Rs. 1,600

(ii) Taylor's differential Piece rate

Efficiency	110%	87.5%
	$\left(\frac{176 \text{ pcs}}{160 \text{ pcs}} \text{ x } 100\right)$	$\left(\frac{140 \text{ pcs}}{160 \text{ pcs}} \text{ x } 100\right)$
Earning	Rs.2,112	Rs.1,120
	(Rs.10x120%x176 pcs)	(Rs.10x80%x140 pcs.)
Emerson's efficiency Plan		
Time Wages	1,600	1,600
	(Rs.40 x 40 hours)	(Rs.40 x 40 hours)
Bonus	480	320
	(20+10)% of (Rs.40x40 hrs)	(20% of 1,600)
Earning	Rs.2,080	Rs.1,920

Q.5) Two workers 'A' and 'B' produce the same product using the same material. Their normal wage rate is also the same. 'A' is paid bonus according to Rowan scheme while 'B' is paid bonus according to Halsey scheme. The time allowed to make the product is 50 hours. 'A' takes 30 hours while 'B' takes 40 hours to complete the product. The factory overhead rate is Rs. 5 per person-hour actually worked. The factory cost of product manufactured by 'A' is Rs.3,490 and for product manufactured by 'B' is Rs.3,600.

Required:

(i) Compute the normal rate of wages.

(ii) Compute the material cost.

(iii) Prepare a statement comparing the factory cost of the product as made by two workers.

Solution:

Workings:

1. Let 'M' be the cost of material and 'L' be the normal rate of wages per hour

	Worker A (Rs.)	**Worker B (Rs.)**
Material cost	M	M
Labour wages	30 L	40 L
Bonus	12 L*	5 L**
Overheads (30 hours × Rs.5); (40 hours × Rs.5)	150	200
Factory cost		
{M + (30 L + 12 L) + 150 = 3,490}	M + 42 L = 3,340 .....(i)	
{M + (40 L + 5 L) + 200 = 3,600}	M + 45 L = 3,400.... (ii)	

* Bonus under Rowan system = $\frac{\text{Time saved}}{\text{Time allowed}}$ Time worked Rate per hour

$= \frac{20 \text{ hours}}{50 \text{ hours}} \times 30\text{hours} \times L$

** Bonus under Halsey system $= \frac{1}{2}$ x Time saved x Rate per hour

$= \frac{1}{2}$ x 10hours x L = 5 L

2. Solving (i) and (ii) to get the value of 'M' and 'L'

M + 42 L = 3,340.....(i)

M + 45 L = 3,400.....(ii)

- 3 L = - 60

L = 20

By substituting the value of 'L' in (i), we will get the value of M

M + 42 × 20 = 3,340 or, M = 2,500

(i) Normal rate of wages is Rs. 20 per hour. (Working Note – 2)

(ii) Cost of materials = Rs. 2,500. (Working Note – 2)

(iii) **Comparative Statement of factory cost**

	Worker A (Rs.)	**Worker B (Rs.)**
Material cost	2,500	2,500
Wages (30 hours × Rs. 20); (40 hours × Rs. 20)	600	800
Bonus (12 × 20); (5 × 20)	240	100
Overheads (30 hours × Rs. 5); (40 hours × Rs. 5)	150	200
Factory cost	3,490	3,600

BUDGETARY CONTROL

Q.1) Following is the sales budget for the first six months of the year 2014 in respect of PQR Ltd. :

Month :	Jan.	Feb.	March	April	May	June
Sales (units) :	10,000	12,000	14,000	15,000	15,000	16,000

Finished goods inventory at the end of each month is expected to be 20% of budgeted sales quantity for the following month. Finished goods inventory was 2,700 units on January 1, 2014. There would be no work-in-progress at the end of any month.

Each unit of finished product requires two types of materials as detailed below:

Material X : 4 kg. @ Rs. 10/kg

Material Y : 6 kg. @ Rs. 15/kg

Material on hand on January 1, 2014 was 19,000 kg. of material X and 29,000 kg. of material Y. Monthly closing stock of material is budgeted to be equal to half of the requirements of next month's production.

Budgeted direct labour hour per unit of finished product is ¾ hour.

Budgeted direct labour cost for the first quarter of the year 2014 is Rs. 10,89,000.

Actual data for the quarter one, ended on March 31, 2014 is as under:

Actual production quantity : 40,000 units

Direct material cost

(Purchase cost based on materials actually issued to production)

Material X : 1,65,000 kg. @ Rs. 10.20 / kg.

Material Y : 2,38,000 kg. @ Rs. 15.10/ kg.

Actual direct labour hours worked : 32,000 hours

Actual direct labour cost : Rs. 13,12,000

Required :

(a) Prepare the following budgets:

(i) Monthly production quantity for the quarter one.

(ii) Monthly raw material consumption quantity budget from January, 2014 to April, 2014.

(iii) Materials purchase quantity budget for the quarter one.

(b) Compute the following variances :

(i) Material cost variance

(ii) Material price variance

(iii) Material usage variance

(iv) Direct labour cost variance

(v) Direct labour rate variance

(vi) Direct labour efficiency variance

Solution:

(a) (i) Production Budget for January to March 2014

(Quantitative)

	Jan	Feb	Mar	April
Budgeted Sales	10,000	12,000	14,000	15,000
Add: Budgeted Closing Stock (20% of sales of next month)	2,400	2,800	3,000	3,000
	12,400	14,800	17,000	18,000
Less: Opening Stock	2,700	2,400	2,800	3,000
Budgeted Output	9,700	12,400	14,200	15,000

Total Budgeted Output for the Quarter ended March 31, 2014

= (9,700 + 12,400 + 14,200)= 36,300 units.

(ii) Raw Material Consumption Budget (in quantity)

Month	Budgeted Output (Units)	Material 'X' @ 4 kg per unit (Kg)	Material 'Y' @ 6 kg per unit (Kg)
January	9,700	38,800	58,200
February	12,400	49,600	74,400
March	14,200	56,800	85,200
April	15,000	60,000	90,000
Total		2,05,200	3,07,800

(iii) Raw Materials Purchase Budget for the Quarter ended March 31, 2014 (in quantity)

	Material X (kg)	Material Y (kg)
Raw material required for production	1,45,200	2,17,800
Add: Closing Stock of raw material	30,000	45,000
	1,75,200	2,62,800
Less: Opening Stock of raw material	19,000	29,000
Material to be purchased	1,56,200	2,33,800

(b) Calculation of Material Cost Variance

(a)	(b)
Std Price × Std Mix × Std Qty for actual output	Std. Price × Std. Mix × Actual Qty.
X – 10 x 4 x 40,000 = 16,00,000	X – 10 x $\frac{4}{10}$ x 4,03,000 = 16,12,000
Y – 15 x 6 x 40,000 = 36,00,000	Y – 15 x $\frac{6}{10}$ x 4,03,000 = 36,27,000
52,00,000	52,39,000

(c)	(d)
Std. Price x Actual Mix x Actual Qty	Actual Price x Actual Mix x Actual Qty.
X – 10 x 1,65,000 = 16,50,000	X – 10.20 x 1,65,000 = 16,83,000
Y – 15 x 2,38,000 = 35,70,000	Y- 15.10 x 2,38,000 = 35,93,800
52,20,000	52,76,800

Direct Material Usage Variance = (a – c)

X – 16,00,000 – 16,50,000 = 50,000 (A)

Y – 36,00,000 – 35,70,000 = 30,000 (F)

52,00,000 – 52,20,000 = 20,000 (A)

Direct Material Price Variance = (c – d)

X – 16,50,000 – 16,83,000 = 33,000 (A)

Y – 35,70,000 – 35,93,800 = 23,800 (A)

52,20,000 – 52,76,800 = 56,800 (A)

Direct Material Cost Variance = (a – d)

X – 16,00,000 – 16,83,000 = 83,000 (A)

Y – 36,00,000 – 35,93,800 = 6,200 (F)

52,00,000 – 52,76,800 = 76,800 (A)

Verification:

Direct Material Cost Variance

= Direct Material Usage Variance + Direct Material Price Variance

= 20,000 (A) + 56,800 (A)

= 76,800 (A)

Alternative Solution (Total basis)

Direct Material Cost Variance = 52, 00,000 – 52, 76,800 =76,800 (A)

Direct Material Price Variance = 52, 20,000 – 52, 76,800 = 56,800 (A)

Direct Material Usage Variance = 52, 20,000 -52, 00,000 = 20,000 (A)

Calculation of Labour Cost Variances:

Budgeted output for the quarter = 36,300 units

Budgeted direct labour hours = 36,300 × ¾ hrs.

= 27,225 hours

Standard or Budgeted labour rate per hour

$$= \frac{\text{Budgeted direct labour hours}}{\text{Budgeted direct labour cost}}$$

$$= \frac{Rs.10,89,000}{27,225 \text{ hours}} = Rs.40$$

Standard labour hours for actual output:

= 40,000 units × ¾ hour

= 30,000 hours

Actual labour hour rate = $\frac{\text{Rs.13,12,000}}{\text{32,000 hrs}}$ =Rs.41

Direct Labour Efficiency Variance = Standard Rate × (Std. hrs – Actual hrs.)

= Rs. 40 × (30,000 – 32,000)

= Rs. 80,000 (A)

Direct Labour Rate Variance = Actual hrs. × (Std. Rate – Actual Rate)

= 32,000 × (40 – 41)

= Rs.32,000 (A)

Direct Labour Cost Variance = (Std. rate × Std. hrs.) – (Actual rate × Actual hrs.)

= (40 × 30,000) – (41 × 32,000)

= 12,00,000 – 13,12,000

= 1,12,000 (A)

Verification:

Direct Labour Cost Variance = Direct Labour Efficiency Variance + Direct Labour Rate Variance

= Rs.80,000 (A) + Rs.32,000 (A)

= 1,12,000 (A)

(Q.2) Pentax Limited has prepared its expense budget for 20,000 units in its factory for the year 2013 as detailed below:

	Rs. per unit
Direct Materials	50
Direct Labour	20
Variable Overhead	15
Direct Expenses	6
Selling Expenses (20% fixed)	15
Factory Expenses (100% fixed)	7
Administration expenses (100% fixed)	4
Distribution expenses (85% variable)	12
Total Rs.	**129**

Prepare an expense budget for the production of 15,000 units and 18,000 units.

Solution : Expense Budget of M/s Pentax Ltd.

Particulars	20,000 Units (Rs.)	15,000 Units (Rs.)	18,000 Units (Rs.)
Direct Material	10,00,000 (20,000 x 50)	7,50,000 (15,000 x 50)	9,00,000 (18,000 x 50)
Direct Labour	4,00,000 (20,000 x 20)	3,00,000 (15,000 x 20)	3,60,000 (18,000 x 20)
Variable Overhead	3,00,000 (20,000 x 15)	2,25,000 (15,000 x 15)	2,70,000 (8,000 x 15)
Direct Expenses	1,20,000 (20,000 x 6)	90,000 (15,000 x 6)	1,08,000 18,000 x 6)
Selling Expenses (Variable)*	2,40,000 (20,000 x 12)	1,80,000 (15,000 x 12)	2,16,000 (18,000 x 12)
Selling Expenses (Fixed)*	60,000 (3 x 20,000)	60,000	60,000
Factory Expenses (Fixed)	1,40,000 (7 x 20,000)	1,40,000	1,40,000
Administration Expenses (Fixed)	80,000 (4 x 20,000)	80,000	80,000
Distribution Expenses (Variable)** Distribution	2,04,000 (10.20 x 20,000)	1,53,000 (10.20 x 15,000)	1,83,600 (10.20 x18,000)
Expenses (Fixed)**	36,000 (1.80 x 20,000)	36,000	36,000
	25,80,000	**20,14,000**	**23,53,600**

*Selling Expenses: Fixed cost per unit = Rs.15 x 20% = Rs.3

Fixed Cost = Rs.3 x 20,000 units = Rs.60,000

Variable Cost Per unit = Rs.15 – Rs.3 = Rs.12

**Distribution Expenses: Fixed cost per unit = Rs.12 x 15% = Rs.1.80

Fixed Cost = Rs.1.80 x 20,000 units = Rs.36,000

Variable cost per unit = Rs.12 – Rs.1.80 = Rs.10.20

(Q.3)

A Light Motor Vehicle manufacturer has prepared sales budget for the next few months, and the following draft figures are available:

Month	No. of vehicles
October	4,000
November	3,500
December	4,500
January	6,000
February	6,500

To manufacture a vehicle a standard cost of Rs. 2,85,700 is incurred and sold through dealers at an uniform selling price of Rs. 3,95,600 to customers. Dealers are paid 12.5% commission on selling price on sale of a vehicle.

Apart from other materials four units of Part-X are required to manufacture a vehicle. It is a policy of the company to hold stocks of Part-X at the end of the each month to cover 40% of next month's production. 4,800 units of Part-X are in stock as on 1st October.

There are 950 nos. of completed vehicles are in stock as on 1st October and it is policy to have stocks at the end of each month to cover 20% of the next month's sales.

You are required to

(a) Prepare Production budget (in nos.) for the month of October, November, December and January.

(b) Prepare a Purchase budget for Part-X (in units) for the months of October, November and December.

(c) Calculate the budgeted gross profit for the quarter October to December.

Solution:

(a) Preparation of Production Budget (in nos.)

	October	November	December	January
Demand for the month (Nos.)	4,000	3,500	4,500	6,000
Add: 20% of next month's demand	700	900	1,200	1,300
Less: Opening Stock	(950)	(700)	(900)	(1,200)
Vehicles to be produced	3,750	3,700	4,800	6,100

(b) Preparation of Purchase budget for Part-X

	October	November	December
Production for the month (Nos.)	3,750	3,700	4,800
Add: 40% of next month's production	1,480 (40% of 3,700)	1,920 (40% of 4,800)	2,440 (40% of 6,100)
No. of units required for production	5,230 20,920 (5,230 × 4 units)	5,620 22,480 (5,620 × 4 units)	7,240 28,960 (7,240 × 4 units)
Less: Opening Stock	(4,800)	(5,920) (1,480 × 4 units)	(7,680) (1,920 × 4 units)
No. of units to be purchased	16,120	16,560	21,280

(c) Budgeted Gross Profit for the Quarter October to December

	October	November	December	Total
Sales in nos.	4,000	3,500	4,500	12,000
Net Selling Price per unit*	Rs.3,46,150	Rs.3,46,150	Rs. 3,46,150	
Sales Revenue (Rs. in lakh)	13,846	12,115.25	15,576.75	41,538
Less: Cost of Sales (Rs. in lakh) (Sales unit × Cost per unit)	11,428	9,999.50	12,856.50 34,284	
Gross Profit (Rs. in lakh)	2,418	2,115.75	2,720.25	7,254

* Net Selling price unit = Rs. 3,95,600 – 12.5% commission on Rs. 3,95,600 = Rs. 3,46,150

(Q.4) Calculate efficiency and activity ratio from the following data:

Capacity ratio = 75%

Budgeted output = 6,000 units

Actual output = 5,000 units

Standard Time per unit = 4 hours

Solution:

$$\text{Capacity Ratio} = \frac{\text{Actual Hours}}{\text{Budgeted Hours}} \times 100$$

$$75\% = \frac{\text{AH}}{\text{6,000 Units x 4 hour per unit}}$$

$$0.75 = \frac{\text{AH}}{\text{24,000 Hours}}$$

$$\text{AH} = 18{,}000 \text{ Hours}$$

$$\text{Efficiency Ratio} = \frac{\text{Actual Output in terms of Standard Hours}}{\text{Actual Working Hours}} \times 100$$

$$= \frac{\text{5,000 units x 4 hours per unit}}{\text{18,000 hours}} \times 100$$

$$= \frac{\text{20,000 Hours}}{\text{18,000 Hours}} \times 100 = 111.11\%$$

$$\text{Activity Ratio} = \frac{\text{Actual Output in terms of Standard Hours}}{\text{Budgeted Output in terms of standard Hours}} \times 100$$

$$= \frac{\text{20,000 Units}}{\text{6,000 Units x 4 houer per unit}} \times 100$$

$$= \frac{\text{20,000 Units}}{\text{24,000 Units}} \times 100$$

$$= 83.33\%$$

STANDARD COSTING

Q.1) SB Constructions Limited has entered into a big contract at an agreed price of Rs.1,50,00,000 subject to an escalation clause for material and labour as spent out on the contract and corresponding details are as follows:

Material:	Standard		Actual	
	Quantity (Tons)	Rate per Ton (Rs.)	Quantity (Tons)	Rate per Ton (Rs.)
A	3,000	1,000	3,400	1,100
B	2,400	800	2,300	700
C	500	4,000	600	3,900
D	100	30,000	90	31,500
Labour:	**Hours**	**Hourly Rate (Rs.)**	**Hours**	**Hourly Rate (Rs.)**
L_1	60,000	15 56,000	18	
L_2	40,000	30 38,000	35	

You are required to:

Calculate the following variances and verify them :

(a) Material Cost Variance

(b) Material Price Variance

(c) Material Usage Variance

(d) Labour Cost Variance

(e) Labour Rate Variance

(f) Labour Efficiency Variance.

Solution:

Material Variances

(SQ × SP)	(Rs.)	(AQ × AP)	(Rs.)	(AQ × SP)	(Rs.)
A-3,000 ×1,000	= 30,00,000	3,400 ×1,100	= 37,40,000	3,400 ×1,000	= 34,00,000
B-2,400 × 800	= 19,20,000	2,300 × 700	= 16,10,000	2,300 × 800	= 18,40,000
C- 500 ×4,000	= 20,00,000	600 × 3,900	= 23,40,000	600 × 4,000	= 24,00,000
D-100×30,000	= 30,00,000	90 × 31,500	= 28,35,000	90 × 30,000	= 27,00,000
Total	99,20,000		1,05,25,000		1,03,40,000

(a) Material Cost Variance (MCV) = (SQ × SP) – (AQ × AP)

= Rs. 99, 20,000 – Rs. 1, 05, 25,000 = Rs. 6, 05,000 (A)

(b) Material Price Variance (MPV) = AQ (SP – AP) or (AQ × SP) – (AQ × AP)

= Rs. 1, 03, 40,000 – Rs. 1, 05, 25,000 = Rs. 1, 85,000 (A)

(c) Material Usage Variance (MUV) = (SQ × SP) – (AQ × SP)

= Rs. 99, 20,000 – Rs. 1, 03, 40,000 = Rs. 4, 20,000(A)

Verification, MCV = MPV + MUV

Or, Rs. 6, 05,000 (A) = Rs. 1, 85,000 (A) + Rs. 4, 20,000 (A)

Or, Rs. 6, 05,000 (A) = Rs. 6, 05,000 (A)

Labour Variances

(SH × SR)	**(Rs.)**	**(AH× AR)**	**(Rs.)**	**(AH× SR)**	**(Rs.)**
L1 –60,000 × 15	= 9,00,000	56,000 × 18	= 10,08,000	56,000 ×15	= 8,40,000
L2 – 40,000 × 30	= 12,00,000	38,000 × 35	= 13,30,000	38,000 × 30	= 11,40,000
Total	21,00,000		23,38,000		19,80,000

(a) Labour Cost Variance (LCV) = (SH × SR) – (AH × AR)

= Rs. 21,00,000 – Rs. 23,38,000 = Rs. 2,38,000 (A)

(b) Labour Rate Variance (LRV) = (AH × SR) – (AH × AR)

= Rs. 19,80,000 – Rs. 23,38,000 = Rs. 3,58,000 (A)

(c) Labour Efficiency Variance (LEV) = (SH × SR) – (AH × SR)

= Rs. 21,00,000 – Rs. 19,80,000 = Rs. 1,20,000 (F)

Verification, LCV = LRV + LEV

Or, Rs. 2,38,000 (A) = Rs. 3,58,000 (A) + Rs. 1,20,000 (F)

Or, Rs. 2,38,000 (A) = Rs. 2,38,000 (A)

Q.2) The standard labour employment and the actual labour engaged in a 40 hours week for a job are as under:

Category of Workers	**Standard**		**Actual**	
	No. of workers	**Wage Rate per hour (Rs.)**	**No. of workers**	**Wage Rate per hour (Rs.)**
Skilled	65	45	50	50
Semi-skilled	20	30	30	35
Unskilled	15	15	20	10

Standard output: 2,000 units; Actual output: 1,800 units

Abnormal Idle time 2 hours in the week

Calculate:

(i) Labour Cost Variance

(ii) Labour Efficiency Variance

(iii) Labour Idle Time Variance.

Solution:

Working Note:

Table Showing Standard & Actual Cost

Worker	Standard Hours (a)	Standard Rate per Hour (b)	Standard Cost for Actual Output (c) = (a x b)	Actual Hours Paid (d)	Actual Rate per hour (e)	Actual Cost (f) = (d) x (e)	Idle time (g)	Actual hours worked (h)=(d)-(g)
Skilled	2,340 hrs. [(65 workers x 40 hrs.) / 2,000 units)] x 1,800 units	Rs.45	Rs.1,05,300	2,000 hrs. (50 workers x 40 hrs.)	Rs.50	Rs.1,00,000	100 hrs. (50 Workers x 2 hrs.)	1,900 hrs. (2,000 hrs – 100 hrs.)
Semi skilled	720 hrs. [(20 Workers x 40 hrs.) / 2,000 units)] x.1,800 units	Rs.30	Rs.21,600	1,200 hrs. (30 workers x 40 hrs.)	Rs.35	Rs.42,000	60 hrs. (30 Workers x 2 hrs.)	1,140 hrs. (1,200 hrs. – 60 hrs.)
Unskilled	540 hrs. [(15 workers x 40 hrs.) / 2,000 units)] x 1,800 units.	Rs.15	Rs.8,100	800 hrs. (20 workers x 40 hrs.)	Rs.10	Rs.8,000	40 hrs. (20 workers x 2 hrs.)	750 hrs. (800 hrs. – 40 hrs.)
Total	3,600 hrs.		Rs.1,35,000	4,000 hrs.		Rs.1,50,000	200 hrs.	3,800 hrs.

Calculation of Variances

(i) Labour Cost Variance = Standard Cost for actual output – Actual cost

Skilled worker = Rs.1,05,300 - Rs.1,00,000

= Rs. 5,300 (F)

Semi-skilled worker = Rs. 21,600 - Rs. 42,000

= Rs. 20,400 (A)

Unskilled Worker = Rs. 8,100 - Rs. 8,000

= Rs.100 (F)

Total = Rs.5,300 (F) + Rs.20,400 (A) + Rs.100 (F)

= Rs.15,000 (A)

(ii) Labour Efficiency Variance = Std. Rate x (Standard hours – Actual hours worked)

Skilled worker = Rs. 45 x (2,340 hrs. - 1,900 hrs.)

= Rs.19,800 (F)

	Semi-skilled worker	= Rs. 30 x (720 hrs. - 1,140 hrs.)
		= Rs. 12,600 (A)
	Unskilled Worker	= Rs. 15 x (540 hrs. - 760 hrs.)
		= Rs. 3,300 (A)
	Total	= Rs.19,800 (F) + Rs.12,600 (A) + Rs.3,300 (A)
		= Rs.3,900 (F)
(iii)	Labour Idle Time Variance	= Std. Rate x Idle Time (Hrs.)
	Skilled worker	= Rs. 45 x 100 hrs.
		= Rs. 4,500 (A)
	Semi-skilled worker	= Rs. 30 x 60 hrs.
		= Rs. 1,800 (A)
	Unskilled worker	= Rs. 15 x 40 hrs.= Rs. 600 (A)
	Total	= Rs. 4,500 (A) + Rs. 1,800 (A) + Rs. 600 (A)
		= Rs. 6,900 (A)

(Q.3) SP Limited produces a product 'Tempex' which is sold in a 10 Kg. packet. The standard cost card per packet of 'Tempex' are as follows:

	(Rs.)
Direct materials 10 kg @ Rs. 45 per kg	450
Direct labour 8 hours @ Rs. 50 per hour	400
Variable Overhead 8 hours @ Rs. 10 per hour	80
Fixed Overhead	200
	1,130

Budgeted output for the third quarter of a year was 10,000 Kg. Actual output is 9,000 Kg.

Actual cost for this quarter are as follows :

	(Rs.)
Direct Materials 8,900 Kg @ Rs. 46 per Kg.	4,09,400
Direct Labour 7,000 hours @ Rs. 52 per hour	3,64,000
Variable Overhead incurred	72,500
Fixed Overhead incurred	1,92,000

You are required to calculate :

(i) Material Usage Variance

(ii) Material Price Variance

(iii) Material Cost Variance

(iv) Labour Efficiency Variance

(v) Labour Rate Variance

(vi) Labour Cost Variance

(vii) Variable Overhead Cost Variance

(viii) Fixed Overhead Cost Variance.

Solution:

(i) Material Usage Variance = Std. Price (Std. Quantity – Actual Quantity)
= Rs. 45 (9,000 kg. – 8,900 kg.)
= Rs. 4,500 (Favourable)

(ii) Material Price Variance = Actual Quantity (Std. Price – Actual Price)
= 8,900 kg. (Rs. 45 – Rs. 46) = Rs. 8,900 (Adverse)

(iii) Material Cost Variance = Std. Material Cost – Actual Material Cost
= (SQ × SP) – (AQ × AP)
= (9,000 kg. × Rs. 45) – (8,900 kg. × Rs. 46)
= Rs. 4,05,000 – Rs. 4,09,400
= Rs.4,400 (Adverse)

(iv) Labour Efficiency Variance = Std. Rate (Std. Hours – Actual Hours)
$= \text{Rs. } 50 \left(\frac{9,000}{10} \text{ x 8 hours - 7,000 hours} \right)$
= Rs. 50 (7,200 hrs. – 7,000 hrs.)
= Rs. 10,000 (Favourable)

(v) Labour Rate Variance = Actual Hours (Std. Rate – Actual Rate)
= 7,000 hrs. (Rs. 50 – Rs.52)
= Rs. 14,000 (Adverse)

(vi) Labour Cost Variance = Std. Labour Cost – Actual Labour Cost
= (SH × SR) – (AH × AR)
= (7,200 hrs. × Rs. 50) – (7,000 hrs. × Rs. 52)
= Rs. 3,60,000 – Rs. 3,64,000
= Rs.4,000 (Adverse)

(vii) Variable Cost Variance = Std. Variable Cost – Actual Variable Cost
= (7,200 hrs. × Rs. 10) – Rs. 72,500
= Rs. 500 (Adverse)

(viii) Fixed Overhead Cost Variance = Absorbed Fixed Overhead – Actual Fixed Overhead
$= \frac{\text{Rs.200}}{\text{10 kgs.}} \text{x 9,000kgs. 1,92,000}$
= Rs. 1,80,000 – Rs. 1,92,000 = Rs. 12,000 (Adverse)

(Q.4) Jigyasa Pharmaceuticals Ltd. is engaged in producing dietary supplement 'Funkids' for growing children. It produces 'Funkids' in a batch of 10 kgs. Standard material inputs required for 10 kgs. of 'Funkids' are as below:

Material	Quantity (in kgs.)	Rate per kg. (in Rs.)
Vita-X	5	110
Proto-D	3	320
Mine-L	3	460

During the month of March, 2014, actual production was 5,000 kgs. of 'Funkids' for which the actual quantities of material used for a batch and the prices paid thereof are as under:

Material	Quantity (in kgs.)	Rate per kg. (in Rs.)
Vita-X	6	115
Proto-D	2.5	330
Mine-L	2	405

You are required to calculate the following variances based on the above given information for the month of March, 2014 for Jigyasa Pharmaceuticals Ltd.:

(i) Material Cost Variance;

(ii) Material Price Variance;

(iii) Material Usage Variance;

(iv) Material Mix Variance;

(v) Material Yield Variance.

Solution:

Material	SQ* × SP	AQ** × SP	AQ** × AP	RSQ*** × SP
Vita-X	Rs. 2,75,000 (2,500 kg. × Rs. 110)	Rs. 3,30,000 (3,000 kg. × Rs. 110)	Rs. 3,45,000 (3,000 kg. × Rs. 115)	Rs. 2,62,460 (2,386 kg. × Rs. 110)
Proto-D	Rs. 4,80,000 (1,500 kg. × Rs. 320)	Rs. 4,00,000 (1,250 kg. × Rs. 320)	Rs. 4,12,500 (1,250 kg. × Rs. 330)	Rs. 4,58,240 (1,432 kg. × Rs. 320)
Mine-L	Rs. 6,90,000 (1,500 kg. × Rs. 460)	Rs. 4,60,000 (1,000 kg. × Rs. 460)	Rs. 4,05,000 (1,000 kg. × Rs. 405)	Rs. 6,58,720 (1,432 kg. × Rs. 460)
Total	Rs. 14,45,000	Rs. 11,90,000	Rs. 11,62,500	Rs. 13,79,420

* Standard Quantity of materials for actual output :

Vita-X $= \frac{5 \text{ kgs.}}{10 \text{ kgs.}} \times 5{,}000\text{kgs.} = 2{,}500\text{kgs.}$

Proto-D $= \frac{3 \text{ kgs.}}{10 \text{ kgs.}} \times 5{,}000\text{kgs.} = 1{,}500\text{kgs.}$

Mine-L $= \frac{3 \text{ kgs.}}{10 \text{ kgs.}} \times 5{,}000\text{kgs.} = 1{,}500\text{kgs.}$

** Actual Quantity of Material used for actual output:

Vita-X $= \frac{6 \text{ kgs.}}{10 \text{ kgs}} \times 5{,}000\text{kgs.} = 3{,}000\text{kgs.}$

Proto-D $= \frac{2.5 \text{ kgs.}}{10 \text{ kgs}} \times 5{,}000\text{kgs.} = 1{,}250\text{kgs.}$

Mine-L $= \frac{2 \text{ kgs.}}{10 \text{ kgs}} \times 5{,}000\text{kgs.} = 1{,}000\text{kgs.}$

***Revised Standard Quantity (RSQ):

Vita-X $= \frac{5 \text{ kgs.}}{11 \text{ kgs.}} \times 5{,}250\text{kgs.} = 2{,}386\text{kgs.}$

Proto-D $= \frac{3 \text{ kgs.}}{11 \text{ kgs}} \times 5{,}250\text{kgs.} = 1{,}432\text{kgs.}$

Mine-L $= \frac{3 \text{ kgs.}}{11 \text{ kgs.}} \times 5{,}250\text{kgs.} = 1{,}432\text{kgs.}$

(i) Material Cost Variance = (Std. Qty. × Std. Price) – (Actual Qty. × Actual Price)

Or = (SQ × SP) – (AQ × AP)

Vita-X	= Rs. 2,75,000 - Rs. 3,45,000	= Rs. 70,000 (A)
Proto-D	= Rs. 4,80,000 - Rs. 4,12,500	= Rs. 67,500 (F)
Mine-L	= Rs. 6,90,000 - Rs. 4,05,000	= Rs. 2,85,000 (F)
		Rs. 2,82,500 (F)

(ii) Material Price Variance = Actual Quantity (Std. Price – Actual Price)

= (AQ × SP) – (AQ × AP)

Vita-X	= Rs. 3,30,000 - Rs. 3,45,000	= Rs. 15,000 (A)
Proto-D	= Rs. 4,00,000 - Rs. 4,12,500	= Rs. 12,500 (A)
Mine-L	= Rs. 4,60,000 - Rs. 4,05,000	= Rs. 55,000 (F)
		Rs. 27,500 (F)

(iii) Material Usage Variance = Std. Price (Std. Qty. – Actual Qty.)

Or = (SQ × SP) – (AQ × SP)

Vita-X	= Rs. 2,75,000 - Rs. 3,30,000	= Rs. 55,000 (A)
Proto-D	= Rs. 4,80,000 - Rs. 4,00,000	= Rs. 80,000 (F)
Mine-L	= Rs. 6,90,000 - Rs. 4,60,000	= Rs. 2,30,000 (F)
		Rs. 2,55,000 (F)

(iv) Material Mix Variance = Std. Price (Revised Std. Qty. – Actual Qty.)

Or = (RSQ × SP) – (AQ × SP)

Vita-X	= Rs. 2,62,460 - Rs. 3,30,000	= Rs. 67,540 (A)
Proto-D	= Rs. 4,58,240 - Rs. 4,00,000	= Rs. 58,240 (F)
Mine-L	= Rs. 6,58,720 - Rs. 4,60,000	= Rs. 1,98,720 (F)
		= Rs. 1,89,420 (F)

(v) Material Yield Variance = Std. Price (Std. Qty. – Revised Std. Qty.)

Or = (SQ × SP) – (RSQ × SP)

Vita-X	= Rs. 2,75,000 - Rs. 2,62,460	= Rs. 12,540 (F)
Proto-D	= Rs. 4,80,000 - Rs. 4,58,240	= Rs. 21,760 (F)
Mine-L	= Rs. 6,90,000 - Rs. 6,58,720	= Rs. 31,280 (F)
		= Rs. 65,580 (F)

(Q.5) Gama Ltd. has furnished the following standard cost data per' unit of production:

Material 10 kg @ Rs. 10 per kg.

Labour 6 hours @ Rs. 5.50 per hour

Variable overhead 6 hours @ Rs. 10 per hour.

Fixed overhead Rs. 4,50,000 per month (Based on a normal volume of 30,000 labour hours.)

The actual cost data for the month of August 2013 are as follows:

Material used 50,000 kg at a cost of Rs. 5,25,000.

Labour paid Rs. 1,55,000 for 31,000 hours worked

Variable overheads Rs. 2,93,000

Fixed overheads Rs. 4,70,000

Actual production 4,800 units.

Calculate:

(i) Material Cost Variance.

(ii) Labour Cost Variance.

(iii) Fixed Overhead Cost Variance.

(iv) Variable Overhead Cost Variance.

Solution:

Budgeted Production 30,000 hours ÷ 6 hours per unit = 5,000 units

Budgeted Fixed Overhead Rate = Rs. 4,50,000 ÷ 5,000 units = Rs. 90 per unit Or

= Rs. 4,50,000 ÷ 30,000 hours = Rs. 15 per hour.

(i) Material Cost Variance = (Std. Qty. × Std. Price) – (Actual Qty. × Actual Price)

= (4,800 units × 10 kg. × Rs.10) - Rs. 5,25,000

= Rs. 4.80,000 – Rs. 5,25,000

= Rs. 45,000 (A)

(ii) Labour Cost Variance = (Std. Hours × Std. Rate) – (Actual Hours × Actual rate)

= (4,800 units × 6 hours × Rs. 5.50) – Rs.1,55,000

= Rs. 1,58,400 – Rs. 1,55,000

= Rs. 3,400 (F)

(iii) Fixed Overhead Cost Variance = (Budgeted Rate × Actual Qty) – Actual Overhead
= (Rs. 90 x 4,800 units) – Rs. 4,70,000
= Rs. 38,000 (A)

OR = (Budgeted Rate × Std. Hours) – Actual Overhead
= (Rs. 15 x 4,800 units × 6 hours) – Rs. 4,70,000
= Rs. 38,000 (A)

(iv) Variable Overhead Cost Variance = (Std. Rate × Std. Hours) – Actual Overhead
= (4,800 units × 6 hours × Rs. 10) - Rs. 2,93,000
= Rs. 2,88,00 - Rs. 2,93,000
= Rs. 5,000 (A)

MARGINAL COSTING

Q.1) A company produces single product which sells for Rs. 20 per unit. Variable cost is Rs. 15 per unit and Fixed overhead for the year is Rs. 6,30,000.

Required:

(a) Calculate sales value needed to earn a profit of 10% on sales.

(b) Calculate sales price per unit to bring BEP down to 1,20,000 units.

(c) Calculate margin of safety sales if profit is Rs. 60,000.

Solution:

(a) Suppose Sales units are x then

$S = V + F + P$

(S = Sales ; V = Variable Cost; F = Fixed Cost; P = Profit)

Rs. 20x = Rs. 15x + Rs. 6,30,000 + Rs. 2x

Rs. 20x – Rs.17x = Rs. 6,30,000

$\therefore x = \frac{6,30,000}{3} = 2,10,000$ units

Sales value = 2,10,000 units x Rs. 20 = Rs. 42,00,000 to earn a profit of 10% on sales.

(b) Sales price to bring down BEP to 1,20,000 units

$$\text{B.E.P (Units)} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}}$$

$$\text{Or, Contribution per unit} = \frac{Rs.6,30,000}{1,20,000 \text{ units}} = \text{Rs.5.25}$$

So, Sales Price = Rs. 15 + Rs. 5.25 = Rs. 20.25

(c) $$\text{Margin of Safety Sales} = \frac{\text{Profit}}{\text{P/V ratio}} \text{ Or, } \frac{\text{Rs.60,000}}{\text{P/V Ratio}}$$

$$\text{where, P/V Ratio} = \frac{\text{Contribution per unit}}{\text{Sales Price}} \text{ x 100 Or, } \frac{\text{Rs.5}}{\text{Rs.20}} \text{ x 100} = 25\%$$

$$\text{Margin of Safety Sales} = \frac{\text{Rs.60,000}}{25\%} = \text{Rs.2,40,000}$$

So if profit is Rs. 60,000, margin of safety sale will be Rs. 2,40,000.

Q.2) PQ Ltd. reports the following cost structure at two capacity levels:

	(100% capacity)	**(75% capacity)**
	2,000 units	1,500 units
Production overhead I	Rs. 3 per unit	Rs. 4 per unit
Production overhead II	Rs. 2 per unit	Rs. 2 per unit

If the selling price, reduced by direct material and labour is Rs. 8 per unit, what would be its break-even point?

Solution:

Computation of Break-even point in units:

	2,000 units	**1,500 units**
Production Overhead I: Fixed Cost (Rs.)	6,000 (2,000 unit x Rs. 3)	6,000 (1,500 unit x Rs. 4)
Selling price – Material and labour (Rs.) (A)	8	8
Production Overhead II (Variable Overhead) (B)	2	2
Contribution per unit (A) – (B)	6	6

Break-even point $\frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{\text{Rs.6,000}}{\text{Rs.6}} = 1{,}000 \text{ units}$

Q.3) A Company sells two products, J and K. The sales mix is 4 units of J and 3 units of K. The contribution margins per unit are Rs. 40 for J and Rs. 20 for K. Fixed costs are Rs. 6,16,000 per month. Compute the break-even point.

Solution:

Let 4x = No. of units of J

Then 3x = no. of units of K

BEP in x units $= \left(\frac{\text{Fixed Cost}}{\text{Contribution}}\right) = \frac{Rs.6,16,000}{(4x \times Rs.40) + (3x \times Rs.20)}$

Or, $x = \frac{\text{Rs.6,16,000}}{\text{Rs.220}} = 2{,}800 \text{ units}$

Break- even point of Product J = 4 × 2,800 = 11,200 units

Break even point of Product K = 3 × 2,800 = 8,400 units

Q.4) The following figures are related to LM Limited for the year ending 31st March, 2014 :

Sales - 24,000 units @ Rs. 200 per unit;

P/V Ratio 25% and Break-even Point 50% of sales.

You are required to calculate:

(i) Fixed cost for the year

(ii) Profit earned for the year

(iii) Units to be sold to earn a target net profit of Rs. 11,00,000 for a year.

(iv) Number of units to be sold to earn a net income of 25% on cost.

(v) Selling price per unit if Break-even Point is to be brought down by 4,000 units.

Solution:

Break- even point (in units) is 50% of sales i.e. 12,000 units.

Hence, Break- even point (in sales value) is 12,000 units x Rs. 200 = Rs. 24,00,000

(i) We know that Break even sales $= \frac{\text{Fixed Cost}}{\text{P/V ratio}}$

Or, Rs. 24,00,000 $= \frac{\text{Fixed Cost}}{25\%}$

Or, Fixed Cost = Rs. 24,00,000 x 25%

= Rs. 6,00,000

So Fixed Cost for the year is Rs. 6,00,000

(ii) Contribution for the year = (24,000 units × Rs. 200) × 25%

= Rs. 12,00,000

Profit for the year = Contribution – Fixed Cost

= Rs. 12,00,000 - Rs. 6,00,000

= Rs. 6,00,000

(iii) Target net profit is Rs.11,00,000

Hence, Target contribution = Target Profit + Fixed Cost

= Rs.11,00,000 + Rs. 6,00,000

= Rs. 17,00,000

Contribution per unit = 25% of Rs. 200 = Rs. 50 per unit

No. of units = $\frac{\text{Rs.17,00,000}}{Rs.50 \text{ per unit}}$ = 34,000 unit

So, 34,000 units to be sold to earn a target net profit of Rs. 11,00,000 for a year.

(iv) Net desired total Sales (Number of unit × Selling price) be x then desired profit is 25% on Cost or 20% on Sales i.e. 0.2 x

Desired Sales = $\frac{\text{Fixed Cost + Desired Profit}}{\text{P/.V Ratio}}$

$x = \frac{6,00,000 + 0.2x}{25\%}$

or, 0.25 x = 6,00,000 + 0.2 x

or, 0.05 x = 6,00,000

or, x = Rs. 1,20,00,000

No. of units to be sold - $\frac{\text{Rs.1,20,00,000}}{Rs.200}$ = 60,000 units

(v) If Break- even point is to be brought down by 4,000 units then Break-even point will be 12,000 units – 4,000 units = 8,000 units

Let Selling price be Rs. x and fixed cost and variable cost per unit remain unchanged i.e. Rs. 6,00,000 and Rs. 150 respectively.

Break even point: Sales revenue = Total cost

$8{,}000\,x = 8{,}000 \times \text{Rs. } 150 + \text{Rs. } 6{,}00{,}000$

Or, $8{,}000\,x = \text{Rs. } 12{,}00{,}000 + \text{Rs. } 6{,}00{,}000$

Or, $x = \dfrac{\text{Rs.}18{,}00{,}000}{8{,}000} = \text{Rs.}225$

$\therefore$ Selling Price should be Rs. 225

Hence, selling price per unit shall be Rs. 225 if Break-even point is to be brought down by 4,000 units.

Q.5) Arnav Ltd. manufacture and sales its product R-9. The following figures have been collected from cost records of last year for the product R-9:

Elements of Cost	**Variable Cost portion**	**Fixed Cost**
Direct Material	30% of Cost of Goods Sold	—
Direct Labour	15% of Cost of Goods Sold	—
Factory Overhead	10% of Cost of Goods Sold	Rs. 2,30,000
General & Administration Overhead	2% of Cost of Goods Sold	Rs. 71,000
Selling & Distribution Overhead	4% of Cost of Sales	Rs. 68,000

Last Year 5,000 units were sold at Rs.185 per unit. From the given data find the followings:

(a) Break-even Sales (in rupees)

(b) Profit earned during last year

(c) Margin of safety (in %)

(d) Profit if the sales were 10% less than the actual sales.

Solution:

Working Notes:

(i) Calculation of Cost of Goods Sold (COGS):

COGS = {(DM- 0.3 COGS) + (DL- 0.15 COGS) + (FOH- 0.10 COGS + Rs. 2,30,000) + (G&AOH- 0.02 COGS + Rs. 71,000)}

Or COGS = 0.57 COGS + Rs. 3,01,000

Or COGS = $\dfrac{\text{Rs.}3{,}01{,}000}{0.43}$ = Rs. 7,00,000

(ii) Calculation of Cost of Sales (COS):

COS = COGS + (S&DOH- 0.04 COS + Rs. 68,000)

Or COS = Rs. 7,00,000 + (0.04 COS + Rs. 68,000)

Or COS $= \frac{Rs.7,68,000}{0.96} = Rs.8,00,000$

(iii) Calculation of Variable Costs:

Direct Material-	(0.3 × Rs. 7,00,000)	Rs. 2,10,000
Direct Labour-	(0.15 × Rs. 7,00,000)	Rs. 1,05,000
Factory Overhead-	(0.10 × Rs. 7,00,000)	Rs. 70,000
General & Administration OH-	(0.02 × Rs. 7,00,000)	Rs. 14,000
Selling & Distribution OH	(0.04 × Rs. 8,00,000)	Rs. 32,000
		Rs. 4,31,000

(iv) Calculation of total Fixed Costs:

Factory Overhead-	Rs. 2,30,000
General & Administration OH-	Rs. 71,000
Selling & Distribution OH	Rs. 68,000
	Rs. 3,69,000

(v) Calculation of P/V Ratio:

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{\text{Sales - Variable Costs}}{\text{Sales}} \times 100$$

$$= \frac{(Rs.185 \times 5,000 \text{ units}) - Rs.4,31,000}{Rs.185 \times 5,000 \text{ units}} \times 100 = 53.41\%$$

(a) Break-Even Sales $= \frac{\text{Fixed Costs}}{\text{P/V Ratio}} = \frac{Rs.3,69,000}{53.41\%} = Rs.6,90,882$

(b) Profit earned during the last year

= (Sales – Total Variable Costs) – Total Fixed Costs

= (Rs. 9,25,000 - Rs. 4,31,000) - Rs. 3,69,000

= Rs. 1,25,000

(c) Margin of Safety (%) $= \frac{\text{Sales - Break even sales}}{\text{Sales}} \times 100$

$$= \frac{Rs.9,25,000 - Rs.6,90,882}{Rs.9,25,000} \times 100 = 25.31\%$$

(d) Profit if the sales were 10% less than the actual sales:

Profit = 90% (Rs. 9,25,000 - Rs. 4,31,000) - Rs. 3,69,000

= Rs. 4,44,600 - Rs. 3,69,000 = Rs. 75,600

(Q.6) Maryanne Petrochemicals Ltd. is operating at 80 % capacity and presents the following information:

Break-even Sales	Rs. 400 crores
P/V Ratio	30 %
Margin of Safety	Rs. 120 crores

Maryanne's management has decided to increase production to 95 % capacity level with the following modifications:

(a) The selling price will be reduced by 10%.

(b) The variable cost will be increased by 2% on sales

(c) The fixed costs will increase by Rs. 50 crores, including depreciation on additions, but excluding interest on additional capital.

Additional capital of Rs. 100 crores will be needed for capital expenditure and working capital.

Required:

(i) Indicate the sales figure, with the working, that will be needed to earn Rs. 20 crores over and above the present profit and also meet 15% interest on the additional capital.

(ii) What will be the revised

(a) Break-even Sales

(b) P/V Ratio

(c) Margin of Safety

Solution :

Working Notes:

1. Total Sales = Break -even Sales + Margin of Safety
   = Rs. 400 crores + Rs. 120 crores
   = Rs. 520 crores
2. Variable Cost = Total Sales × (1- P/V Ratio)
   = Rs. 520 crores × (1 – 0.3)
   = Rs. 364 crores
3. Fixed Cost = Break-even Sales × P/V Ratio
   = Rs. 400 crores × 30%
   = Rs. 120 crores
4. Profit = Total Sales – (Variable Cost + Fixed Cost)
   = Rs. 520 crores – (Rs. 364 crores + Rs. 120 crores)
   = Rs. 36 crores

(i) Revised Sales figure to earn profit of Rs. 56 crores (i.e. Rs. 36 crores + Rs. 20 crores)

$$\text{Revised Sales} = \frac{\text{Revised Fixed Cost * + Desired Profit}}{\text{Revised P/V Ratio**}}$$

$$= \frac{\text{Rs.185 crores + Rs.56 crores}}{28\%}$$

= Rs. 860.71 Crores

*Revised Fixed Cost = Present Fixed Cost + Increment in fixed cost + Interest on additional Capital

= Rs. 120 crores + Rs. 50 crores + 15% of Rs. 100 crores

= Rs. 185 crores

**Revised P/V Ratio : Let current selling price per unit be Rs. 100.

Therefore, Reduced selling price per unit = Rs. 100 × 90% = Rs. 90

Revised Variable Cost on Sales = 70%+ 2% = 72%

Variable Cost per unit = Rs. 90 × 72% = Rs. 64.80

Contribution per unit = Rs. 90 - Rs. 64.80 = Rs. 25.20

$$\text{Revised P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{\text{Rs.25.2}}{\text{Rs.90}} \times 100 = 28\%$$

(ii) (a) $$\text{Revised Break-even Sales} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}} \times 100 = \frac{\text{Rs.185 crores}}{28\%} = \text{Rs.660.71 crores}$$

(b) Revised P/V Ratio = 28 % (as calculated above)

(c) Revised Margin of safety = Total Sales – Break-even Sales

= Rs. 860.71 crores - Rs. 660.71 crores

= Rs. 200 crores.